

-- STATE OF NORTH CAROLINA --
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

ADDENDUM #3
TO



SECOND INDUSTRY DRAFT REQUEST FOR PROPOSAL

DESIGN-BUILD PROJECT

TIP U-5713 / R-5777A & B

~~March 19~~ **April 3, 2019**



VOID FOR BIDDING

DATE AND TIME OF TECHNICAL AND PRICE PROPOSAL SUBMISSION: ~~MAY 30~~ **AUGUST 22, 2019 BY 4:00 PM**

DATE AND TIME OF PRICE PROPOSAL OPENING: ~~JUNE 18~~ **SEPTEMBER 17, 2019 AT 2:00 PM**

CONTRACT ID: C 204225

WBS ELEMENT NO. 50111.3.1

FEDERAL-AID NO. N/A

COUNTY: Craven

ROUTE NO. U.S. 70

MILES: 5.1

LOCATION: U.S. 70 from the eastern approach of the Neuse River Bridge to approximately one (1) mile east of S.R. 1116 (Thurman Road)

TYPE OF WORK: DESIGN-BUILD AS SPECIFIED IN THE SCOPE OF WORK
CONTAINED IN THE REQUEST FOR PROPOSALS

NOTICE:

ALL PROPOSERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE PROPOSER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS \$30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. PROPOSERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOT WITHSTANDING THESE LIMITATIONS ON BIDDING, THE PROPOSER WHO IS AWARDED ANY PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING, REGARDLESS OF FUNDING SOURCES.

5% BID BOND OR BID DEPOSIT REQUIRED

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- Itemized Proposal Sheet (TAN SHEET)
- Fuel Usage Factor Chart and Estimate of Quantities
- Listing of DBE Subcontractors
- Listing of MBE / WBE Subcontractors
- Execution of Bid, Non-Collusion Affidavit, Debarment Certification and Gift Ban Certification
- Signature Sheet

***** PROJECT SPECIAL PROVISIONS *****

CONTRACT TIME AND LIQUIDATED DAMAGES

(7-12-7)

DB1 G04A

The date of availability for this contract is ~~July 29~~October 28, 2019, except that the Design-Build Team shall only begin ground disturbing activities as allowed by this Request for Proposals (RFP). The Design-Build Team shall consider this factor in determining the proposed completion date for this project.

The completion date for this contract is defined as the date proposed in the Technical Proposal by the proposer who is awarded the project. The completion date thus proposed shall not be later than ~~November 15, 2023~~May 15, 2024.

When observation periods are required by the special provisions, they are not a part of the work to be completed by the completion date and / or intermediate contract times. Should an observation period extend beyond the Final Completion Date proposed by the Design-Build Team in the Technical Proposal, the performance and payment bonds shall remain in full force and effect until the observation period has been completed and the work accepted by the Department.

The liquidated damages for this contract are **Fifteen Thousand Dollars (\$ 15,000.00)** per calendar day. As an exception to this amount, where the contract has been determined to be substantially complete as defined by the *Substantial Completion* Project Special Provision found elsewhere in this RFP, the liquidated damages will be reduced to **Five Thousand Dollars (\$5,000.00)** per calendar day.

Where the Design-Build Team who is awarded the contract has proposed a completion date for the contract as required above, but also has proposed an earlier date for substantial completion, then both of these proposed dates will become contract requirements.

Liquidated damages of **Fifteen Thousand Dollars (\$ 15,000.00)** per calendar day will be applicable to the early date for substantial completion proposed by the bidder. Liquidated damages of **Five Thousand Five Hundred Dollars (\$5,000.00)** per calendar day will be applicable to the Final Completion Date proposed by the bidder where the Design-Build Team has proposed an earlier date for substantial completion.

SCHEDULE OF ESTIMATED COMPLETION PROGRESS

(9-1-11) (Rev. 8/31/17)

DB1 G58

The Design-Build Team's attention is directed to the *Availability of Funds - Termination of Contracts* Standard Special Provision found elsewhere in this RFP. The Department of Transportation's schedule of estimated completion progress for this project, as required by that Standard Special Provision, is as follows:

<u>Fiscal Year</u>	<u>Progress (% of Dollar Value)</u>
2020 (07/01/19 – 06/30/20)	15 <u>11</u> % of Total Amount Bid
2021 (07/01/20 – 06/30/21)	38 <u>31</u> % of Total Amount Bid
2022 (07/01/21 – 06/30/22)	26 <u>28</u> % of Total Amount Bid
2023 (07/01/22 – 06/30/23)	18 <u>21</u> % of Total Amount Bid
2024 (07/01/23- 08/20/24)	3 <u>9</u> % of Total Amount Bid

The Design-Build Team shall also furnish its own progress schedule in accordance with Article 108-2 of the 2018 Standard Specifications for Roads and Structures. Any acceleration of the progress as shown by the Design-Build Team's progress schedule over the progress as shown above shall be subject to the approval of the Engineer.

HIGH DEFINITION CCTV METAL POLE WITH CCTV LOWERING SYSTEM AND FIELD EQUIPMENT

(3-12-19)

DB 08-04a

1. HIGH DEFINITION CCTV DESCRIPTION

The Design-Build Team shall provide and install High Definition (1080p) CCTV field equipment described in these Project Special Provisions. Ensure equipment is fully compatible with all features of the existing VideoPro video management software currently in use by NCDOT in this Region.

Obtain approval of the camera locations and orientation from the Engineer prior to installing the CCTV camera assemblies.

1.2 MATERIAL

General

The Design-Build Team shall provide and install new CCTV camera assemblies at the locations approved by the Engineer that consist of the following:

1. Dome CCTV camera that contains in a single enclosed unit the following:
 - a. CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories
 - b. Motorized pan, tilt, and zoom
 - c. Pole-mount camera attachment assembly.
 - d. All necessary cable, connectors and incidental hardware to make a complete and operable system
2. Lightning arrestors installed in-line between the CCTV camera and the equipment cabinet components.
3. A NEMA Type 4 enclosure constructed of aluminum with a clear acrylic dome or approved equal camera unit housing.

Camera and Lens

The Design-Build Team shall provide new 1/4-inch charged-coupled device (CCD) color day / night cameras. The Design-Build Team shall provide cameras with automatic gain control (AGC) for clear images in varying light levels. The camera shall meet the following minimum requirements:

- Video signal format: NTSC compatible resolution, user selectable up to a maximum of 1920 x 1080 (1080p),
- Image sensor resolution: 768 horizontal pixels by 752 vertical pixels,
- Automatic gain control (AGC): 0-20 dB, peak-average adjustable,

- White balance: Automatic through the lens with manual override,
- Electronic-shutter: Dip-switch selectable NTSC electronic shutter with speed range from 1/2 of a second (off) to 1/30,000 of a second (NTSC),
- Overexposure protection: Built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun,
- Gain control: Automatic and manual,
- Sensitivity: 1.5 lux at 90% scene reflectance,
- Sync system: Internal AC line lock, phase adjustable using remote control, V-sync,
- Signal to noise ratio: Greater than 50 dB,
- Video output connection: 1-volt peak to peak, 75 ohms terminated, BNC connector, and
- Primary voltage: 120 VAC,
- Camera voltage: 24 VAC or 24 VDC, and
- Camera power: 73 VA with heater at 24 VAC or 3A at 24 VDC.

Zoom Lens

The Design-Build Team shall provide each camera with a motorized zoom lens with automatic iris control with manual override and neutral density spot filter. The Design-Build Team shall provide lenses that meet the following optical specifications:

- Automatic focus: Automatic with manual override,
- Horizontal angle of view: 55.4 degrees at 3.6 mm wide zoom and 2.9 degrees at 82 mm telephoto zoom,
- Focal length: 3.6 mm to 124 mm, 30X optical zoom, 12X electronic zoom,
- Zoom Speed: 2.9, 4.2 and 5.8 seconds,
- Lens aperture: Minimum of f/1.6,
- Maximum Sensitivity at 30 IRE: .07 lux at 1/2 second color, .2 lux at 1/60 second black and white, .015 lux at 1/2 sec. black and white,
- Preset positioning: Minimum of 128 presets.

The lens shall be capable of both automatic and remote manual control iris and focus override operation. The lens shall be equipped for remote control of zoom and focus, including automatic movement to any of the preset zoom and focus positions. The Design-Build Team shall provide mechanical or electrical means to protect the motors from overrunning in extreme positions. The operating voltages of the lens shall be compatible with the outputs of the camera control.

Camera Housing

Furnish new dome style enclosures for the CCTV assemblies. Equip each housing with a mounting assembly for attachment to the CCTV lowering system. The enclosures must be equipped with a sunshield and be fabricated from corrosion resistant aluminum and finished in a neutral color of

weather resistant enamel. The enclosure must meet or exceed NEMA 4X and IP66 ratings. The viewing area of the enclosure must be tempered glass.

Pan and Tilt Unit

Equip each new dome style assembly with a pan and tilt unit. The pan and tilt unit shall be integral to dome system. The pan and tilt unit shall be rated for outdoor operation, provide dynamic braking for instantaneous stopping, prevent drift, and have minimum backlash. The dome shall have an auto flip dome rotation to rotate and reposition camera for viewing objects passing below camera. The Design-Build Team shall provide electronic image stabilization. The pan and tilt units shall meet or exceed the following specifications:

- Pan: Continuous 360 degrees
- Tilt: +2 to -92 degrees minimum
- Presets: Minimum of 128 presets
- Preset accuracy: .1 degree
- Preset pan speed: .1 degrees / second to 200 degrees/second
- Preset tilt speed: .1 degrees / second to 400 degrees/second
- Privacy zones: Minimum of eight user configurable shapes
- Input voltage: 24 VDC or 24 VAC
- Motors: Two-phase induction type, continuous duty, instantaneous reversing
- Preset Positioning: 64 PTZ presets per camera

Control Receiver / Driver

The Design-Build Team shall provide each new camera unit with a control receiver / driver that is integral to the CCTV dome assembly. The control receiver / driver will receive serial asynchronous data initiated from a camera control unit, decode the command data, perform error checking, and drive the pan / tilt unit, camera controls, and motorized lens. As a minimum, the control receiver/drivers shall provide the following functions:

- Zoom in / out
- Automatic focus with manual override
- Tilt up / down
- Automatic iris with manual override
- Pan right / left
- Minimum 64 preset positions for pan, tilt, and zoom

In addition, each control receiver/driver shall accept status information from the pan / tilt unit and motorized lens for preset positioning of those components. The control receiver / driver will relay pan, tilt, zoom, and focus positions from the field to the remote camera control unit. The control receiver / driver shall accept “goto” preset commands from the camera control unit, decode the command data, perform error checking, and drive the pan/tilt and motorized zoom lens to the correct preset position. The preset commands from the camera control unit will consist of unique values for the desired pan, tilt, zoom, and focus positions.

Surge Suppression

Protect all equipment with metal oxide varistors connecting each power conductor to ground.

Protect coaxial cable from each camera by a surge protector at each end of the cable.

1.3 CONSTRUCTION METHODS

General

Mount CCTV camera units 5' from the top of the pole or as directed by the Engineer. Position the camera to enable viewing traffic in all directions and as approved by the Engineer.

Mount CCTV cameras on the side of poles nearest intended field of view. Avoid occluding the view with the pole.

Electrical and Mechanical Requirements

Ground all equipment as called for in the Standard Specifications, these Special Provisions, and the plans developed by the Design-Build Team.

Install surge protectors on all ungrounded conductors entering the CCTV enclosure. House the protectors in a small, ventilated weatherproof cabinet attached near the CCTV attachment point in a manner approved by the Engineer.

2. CCTV EQUIPMENT CABINET DESCRIPTION

The Design-Build Team shall provide 336 pole mounted cabinets to house CCTV control and communications equipment. The cabinets shall consist of a cabinet housing, 19-inch EIA mounting cage, and power distribution assembly (PDA #3 as described in the CALTRANS TSCES).

The cabinet housing shall conform to sections 6.2.2 (Housing Construction), 6.2.3 (Door Latches and Locks), 6.2.4 (Housing Ventilation), and 6.2.5 (Hinges and Door Catches) of the CALTRANS TSCES. Do not equip the cabinet housings with a police panel.

The cabinet cage shall conform to section 6.3 of the CALTRANS TSCES.

Terminal blocks on the PDA #3 Assembly have internal wiring for the Model 200 switch pack sockets. Do not use terminal blocks on PDA #3 as power terminals for cabinet devices. Do not furnish cabinet with "Input Panels" described in section 6.4.7.1 of the TSCES. Do furnish cabinet with "Service Panels" as described in section 6.4.7.1 of the TSCES and as depicted on drawing TSCES-9 in the TSCES. Use service panel #2.

The Design-Build Team shall provide terminal blocks for power for cabinet CCTV and communications devices as needed to accommodate the number of devices in the cabinet.

Do not furnish cabinets with C1, C5, or C6 harness, input file, output file, monitor units, model 208 unit, model 430 unit, or switch packs.

The Design-Build Team shall provide all conduits, shelving, mounting adapters, and other equipment as necessary to route cabling, mount equipment, and terminate conduit in equipment cabinet.

2.2 MATERIAL

Shelf Drawer

The Design-Build Team shall provide a pull out, hinged-top drawer, having sliding tracks, with lockout and quick disconnect feature in the equipment cabinet. The Design-Build Team shall provide a pullout drawer that extends a minimum of 14 inches that is capable of being lifted to gain access to the interior of the drawer. Minimum interior dimensions of the drawer are to be one inch high, 13 inches deep, and 16 inches wide. The Design-Build Team shall provide drawers capable of supporting a 40-pound device or component when fully extended.

Cabinet Light

Each cabinet shall include two (2) fluorescent lighting fixtures (one front, one back) mounted horizontally inside the top portion of the cabinet. The fixtures shall include a cool white lamp, and shall be operated by normal power factor UL-listed ballast. A door-actuated switch shall be installed to turn on the applicable cabinet light when the front door or back door is opened. The lights shall be mounted not to interfere with the upper door stay.

Surge Protection for System Equipment

Each cabinet shall be provided with devices to protect the CCTV and communications equipment from electrical surges and over voltages as described below.

Main AC Power Input

Each cabinet shall be provided with a hybrid-type, power line surge protection device mounted inside the power distribution assembly. The protector shall be installed between the applied line voltage and earth ground. The surge protector shall be capable of reducing the effect of lighting transient voltages applied to the AC line. The protector shall be mounted inside the Power Distribution Assembly housing facing the rear of the cabinet. The protector shall include the following features and functions:

- Maximum AC line voltage: 140 VAC.
- Twenty pulses of peak current, each of which shall rise in 8 microseconds and fall in 20 microseconds to ½ the peak: 20000 Amperes.
- The protector shall be provided with the following terminals:
 - Main Line (AC Line first stage terminal).
 - Main Neutral (AC Neutral input terminal).
 - Equipment Line Out (AC line second state output terminal, 19 amps).
 - Equipment Neutral Out (Neutral terminal to protected equipment).
 - GND (Earth connection).
- The Main AC line in and the Equipment Line out terminals shall be separated by a 200 Microhenry (minimum) inductor rated to handle 10 AMP AC Service.

- The first stage clamp shall be between Main Line and Ground terminals.
- The second stage clamp shall be between Equipment Line Out and Equipment Neutral.
- The protector for the first and second stage clamp shall have an MOV or similar solid state device rated at 20 KA and shall be of a completely solid state design (i.e., no gas discharge tubes allowed).
- The Main Neutral and Equipment Neutral Out shall be connected together internally and shall have an MOV similar solid state device or gas discharge tube rated at 20 KA between Main Neutral and Ground terminals.
- Peak Clamp Voltage: 350 volts at 20 KA. (Voltage measured between Equipment Line Out and Equipment Neutral Out terminals. Current applied between Main Line and Ground Terminals with Ground and Main Neutral terminals externally tied together).
- Voltage shall never exceed 350 volts.
- The Protector shall be epoxy-encapsulated in a flame-retardant material.
- Continuous service current: 10 Amps at 120 VAC RMS.
- The Equipment Line Out shall provide power to cabinet CCTV and communications equipment and to the 24V power supply.

Ground Bus

The Design-Build Team shall provide a neutral bus that is not connected to the earth ground or the logic ground anywhere within the cabinet. Ensure that the earth ground bus and the neutral ground bus each have ten compression type terminals, each of which can accommodate wires ranging from number 14 through number 4 AWG.

Uninterruptible Power Supply (UPS)

The Design-Build Team shall provide and install one rack mounted UPS in each new cabinet that meet the following minimum specifications:

Output

Output Power Capacity	480 Watts / 750 VA
Max Configurable Power	480 Watts / 750 VA
Nominal Output Voltage	120V
Output Voltage Distortion	Less than 5% at full load
Output Frequency (sync to mains)	57 - 63 Hz for 60 Hz nominal
Crest Factor	up to 5:1
Waveform Type	Sine wave
Output Connections	(4) NEMA 5-15R

Input

Nominal Input Voltage	120V
Input Frequency	50 / 60 Hz +/- 3 Hz (auto sensing)
Input Connections	NEMA 5-15P
Cord Length	6 feet
Input voltage range for main operations	82 - 144V
Input voltage adjustable range for mains operation	75 -154 V

Battery Type

Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leak-proof.

Typical recharge time 2 hours

Communications & Management

Interface Port(s) DB-9 RS-232, USB
Control panel LED status display with load and battery bar-graphs

Surge Protection and Filtering

Surge energy rating 480 Joules

Environmental

Operating Environment 32 - 104° F
Operating Relative Humidity 0 - 95%
Storage Temperature 5 - 113° F
Storage Relative Humidity 0 - 95%

Conformance

Regulatory Approvals FCC Part 15 Class A, UL 1778

2.3 CONSTRUCTION METHODS

For each equipment cabinet installation, use stainless steel banding or other method approved by the Engineer to fasten cabinet to pole. Install equipment cabinets so that the height to the middle of the enclosure is four feet from ground level. No risers shall enter the top or sides of the equipment cabinet.

Install all conduits, condulets, and attachments to equipment cabinets in a manner that preserves the minimum bending radius of cables and creates water proof connections and seals.

Install a UPS in each cabinet and power all CCTV cameras from the UPS.

Install a level concrete technician pad measuring a minimum four inches thick, 24 inches wide and 36 inches long at the front door of the CCTV equipment cabinet.

3. CCTV METAL POLES

3.1 Description

A. CCTV Metal Poles

The Design-Build Team shall provide and install CCTV metal poles, grounding systems, and all necessary hardware. The work covered by this special provision includes requirements for the design, fabrication, and installation of custom designed CCTV metal poles and associated foundations.

The Design-Build Team shall provide designs of completed assemblies with hardware that equals or exceeds AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition, 2013, including the latest interim specifications and latest interim revisions. The Design-Build Team shall provide assemblies with a round or near-round (18 sides or more) cross-section, or a multi sided cross section with no less than six sides. The sides may be straight, convex, or concave.

B. Drilled Pier Foundations

Design, furnish and install foundations for CCTV metal poles with all necessary hardware in accordance with the plans and specifications.

Design all CCTV pole foundations using actual soil conditions at each pole location. Perform soil test in accordance with sub-section (1) Soil Test of this special provision.

Any additional costs associated with a non-standard site-specific foundation including additional materials, labor and equipment will be considered incidental to the lump sum bid for the entire project. All costs for the non-standard foundation design will also be considered incidental to lump sum bid for the entire project.

Analysis procedures and formulas shall be based on AASHTO, ACI code and per FHWA manuals. Design methods based on engineering publications or research papers needs to have prior approval from NCDOT. The Department reserves the right to accept or disapprove any method used for the analysis.

Use a Factor of Safety of 1.33 for torsion and 2.0 for bending for the foundation design.

Foundation design for lateral load shall not exceed 1" lateral deflection at top of foundation.

Design all custom foundations to carry the maximum capacity of each metal pole.

When poor soil conditions are encountered which could create an excessively large foundation design, consideration may be given to allowing an exemption to the maximum capacity design. The Design-Build Team shall gain approval from the engineer before reducing a foundation's capacity. On projects where poor soil is known to be present, it is advisable that the Design-Build Team consider getting foundations approved before releasing poles for fabrication.

Soil Test

(a) General

Drilled piers are reinforced concrete sections, cast in place against in situ, undisturbed material. Drilled piers are of straight shaft type and vertical.

Some standard drilled piers for supporting poles with mast arms may require wing walls to resist torsional rotation. Based upon this provision and the results of the required soil test, a drilled pier length and wing wall requirement may be determined and constructed in accordance with the plans developed by the Design-Build Team.

For non-standard site-specific poles, the Design-Build Team-selected pole fabricator will determine if the addition of wing walls is necessary for the supporting foundations.

(b) Soil Test Procedure

Perform a soil test at each proposed metal pole location. Complete all required fill placement and excavation at each signal pole location to finished grade before drilling each boring. Soil tests performed that are not in compliance with this requirement may be rejected and will not be paid. Drill one boring to a depth of 26 feet within a 25-foot radius of each proposed foundation.

Perform standard penetration tests (SPT) in accordance with ASTM D 1586 at depths of 1, 2.5, 5, 7.5, 10, 15, 20 and 26 feet. Discontinue the boring if one of the following occurs:

A total of 100 blows have been applied in any 2 consecutive 6-inch intervals,

A total of 50 blows have been applied with < 3-inch penetration.

Describe each CCTV pole location along the project corridor in a manner that is easily discernible to both the Design-Build Team's designer and NCDOT reviewers. If a CCTV pole is at an intersection, label the boring the "Intersection of (Route or SR #), (Street Name) and (Route or SR #), (Street Name), _____ County, Signal Inventory No. _____". Label borings with "B- N, S, E, W, NE, NW, SE or SW" corresponding to the quadrant location within the intersection.

If the CCTV pole location is located between intersections, The Design-Build Team shall provide a coordinate location and offset, or milepost number and offset. Pole numbers should be made available to the geotechnical drilling Contractor. Include pole numbers in the boring label if they are available. If they are not available, ensure the boring labels can be cross-referenced to

corresponding pole numbers or pole locations. For each boring, submit a legible (hand written or typed) boring log signed and sealed by a licensed Geologist or Professional Engineer registered in North Carolina. Include on each boring the SPT blow counts and N-values at each depth, depth of the boring, and a general description of the soil types encountered.

Borings that can't be easily related to their specific pole location will be returned to the Design-Build Team for clarification, or if approved by the engineer, the foundation may be designed using the worst-case soil condition obtained as part of this project.

Standard Foundation Determination

Use the following method for determining the Design N-value:

$$N_{AVG} = \frac{(N@1' + N@2.5' + \dots + N@Deepest \text{ Boring Depth})}{\text{Total Number of N-values}}$$

$$Y = (N@1')^2 + (N@2.5')^2 + \dots + (N@Deepest \text{ Boring Depth})^2$$

$$Z = (N@1' + N@2.5' + \dots + N@Deepest \text{ Boring Depth})$$

$$N_{STD \text{ DEV}} = \left(\frac{(\text{Total Number of N-values} \times Y) - Z^2}{(\text{Total Number of N-values}) \times (\text{Total Number of N-values} - 1)} \right)^{0.5}$$

Design N-value equals lesser of the following two conditions:

$$N_{AVG} - (N_{STD \text{ DEV}} \times 0.45)$$

Or

$$\text{Average of First Four N-Values} = \frac{(N@1' + N@2.5' + N@5' + N@7.5')}{4}$$

Note: If less than 4 N-values are obtained because of criteria listed in Section 2 above, use average of N-values collected for second condition. Do not include the N-value at the deepest boring depth for above calculations if the boring is discontinued at or before the required boring depth because of criteria listed in Section 2 above. Use N-value of zero for weight of hammer or weight of rod. If N-value is greater than 50, reduce N-value to 50 for calculations.

Submit completed boring logs collected in accordance with sub-section (1) Soil Test above along with pole loading diagrams to the Design-Build Team-selected pole fabricator to assist in the pole and foundation design.

If one of the following occurs, the Standard Foundations Chart shown on the plans developed by the Design-Build Team may not be used and a non-standard foundation may be required. In such case, contact the Engineer.

The Design N-value is less than 4.

The drilled pier length, “L”, determined from the Standard Foundations Chart, is greater than the depth of the corresponding boring.

In the case where a standard foundation cannot be used, the Design-Build Team shall be responsible for all additional design and construction costs associated with the non-standard foundation.

Foundation designs shall be based on level ground around the traffic signal pole. If the slope around the edge of the drilled pier is steeper than 8:1 (H:V) or the proposed foundation will be less than ten feet from the top of an embankment slope, the Design-Build Team shall be responsible for providing slope information to the foundation designer and to the Engineer so it can be considered in the design and review, respectively.

The “Metal Pole Standard Foundation Selection Form” may be found at:

<https://connect.ncdot.gov/resources/safety/ITS%20and%20Signals%20Resources/Standard%20Foundation%20Selection%20Form.pdf>

If assistance is needed, contact the Engineer.

Non-Standard Foundation Design:

Design non-standard foundations based upon site-specific soil test information collected in accordance with sub-section (1) Soil Test above. Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges*. Use the computer software LPILE version 6.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Use the computer software gINT version 8i or latest manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. The Design-Build Team shall provide a drilled pier foundation for each pole with a length and diameter that result in a horizontal lateral movement of less than 1 inch at the top of the pier and a horizontal rotational movement of less than 1 inch at the edge of the pier. Submit any non-standard foundation designs including drawings, calculations, and soil boring logs to the Engineer for review and approval before construction. Foundations installed without prior approval may be rejected.

3.2 MATERIALS

CCTV Metal Poles

The Design-Build Team shall provide CCTV poles that are a minimum of 50 feet tall.

Fabricate CCTV metal pole from coil or plate steel to meet the requirements of

ASTM A 595 Grade A tubes. For structural steel shapes, plates and bars use A572 Gr 50 min or ASTM A709 Gr 50 min. The Design-Build Team shall provide poles that are round in cross section or multisided tubular shapes and have a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single ply plate or coil so there are no circumferential weld splices. Galvanize in accordance with AASHTO M 111 and / or ASTM A 123 or an approved equivalent.

Ensure that allowable pole deflection does not exceed that allowed per 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition, and the latest Interim Specifications. Ensure that maximum deflection at the top of the pole does not exceed 2.5 percent of the pole height.

Use the submerged arc process or other NCDOT previously approved process suitable for poles to continuously weld pole shafts along their entire length. The longitudinal seam weld will be finished flush to the outside contour of the base metal. Ensure shafts have no circumferential welds except at the lower end joining the shaft to the pole base. In the event that a circumferential weld is necessary, prior approval is required from the Engineer and NCDOT Materials and Test Unit. The Design-Build Team shall provide welding that conforms to Article 1072-18 of the 2018 *Standard Specifications for Roads and Structures*, except that no field welding on any part of the pole will be permitted unless approved by a qualified engineer. Refer to Metal Pole Standard Drawing Sheets M2 through M5 for fabrication details. Fabricate anchor bases from plate steel meeting, as a minimum, the requirements of ASTM A 572M Gr 50, AASHTO M270 Gr 50, ASTM A709 Gr 50, or cast steel meeting the requirements of ASTM A 27M Grade 485-250 36 or an approved equivalent. Conform to the applicable bolt pattern and orientation as shown on Metal Pole Standard Drawing Sheet M2.

Ensure all hardware is galvanized steel or stainless steel. The Design-Build Team shall be responsible for ensuring that the designer / fabricator specifies connecting hardware and / or materials that do not create a dissimilar metal corrosive reaction.

Unless otherwise required by the design, ensure each anchor rod is two-inch diameter and 60" length. The Design-Build Team shall provide ten-inch minimum thread projection at the top of the rod, and eight-inch minimum at the bottom of the rod. Use anchor rod assembly and drilled pier foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

For each structural bolt and other steel hardware, hot dip galvanizing shall conform to the requirements of AASHTO M 232 (ASTM A 153). Ensure end caps for poles are constructed of cast aluminum conforming to Aluminum Alloy 356.0F.

The Design-Build Team shall provide a circular anchor bolt lock plate that will be secured to the anchor bolts at the embedded end with two washers and two nuts. The Design-Build Team shall provide a base plate template that matches the bolt circle diameter of the anchor bolt lock plate. Construct plates and templates from ¼-inch minimum thick steel with a minimum width of four inches. Galvanizing is not required.

The Design-Build Team shall provide four heavy hex nuts and four flat washers for each anchor bolt. For nuts, use AASHTO M291 grade 2H, DH, or DH3 or equivalent material. For flat washers, use AASHTO M293 or equivalent material.

The Design-Build Team shall provide a two-inch hole equipped with an associated coupling and weatherhead approximately five feet below the top of the pole to accommodate passage of CCTV cables from inside the pole to the CCTV camera.

The Design-Build Team shall provide a 2-inch hole equipped with an associated coupling and conduit fittings/bodies approximately 18-inches above the base of the pole accommodate passage of CCTV cables from the CCTV cabinet to the inside of the pole. Refer to Metal Pole Standard Drawing Sheet M3 for fabrication details.

The Design-Build Team shall provide a hand hole access with a watertight cover at a 42-inch height above the base of the metal pole and of the type and size required by the manufacturer of the internal CCT Lowering System to ensure smooth and efficient operation of the CCTV lowering system.

Have metal poles permanently stamped above the base hand hole with the identification tag details as shown on Metal Pole Standard Drawing Sheet M2.

For each pole, The Design-Build Team shall provide a ½-inch minimum thread diameter, coarse thread stud and nut for grounding which will accommodate #4 AWG ground wire. Ensure that the lug is electrically bonded to the pole and is conveniently located inside the pole at the hand hole.

The Design-Build Team shall provide a removable pole cap with stainless steel attachment screws for the top of each pole. Ensure that the cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to the pole with a sturdy chain or cable approved by the Engineer. Ensure that the chain or cable is long enough to permit the cap to hang clear of the pole-top opening when the cap is removed.

After fabrication, have steel poles, required mast arms, and all parts used in the assembly hot-dip galvanized per section 1076. Design structural assemblies with weep holes large enough and properly located to drain molten zinc during galvanization process. The Design-Build Team shall provide hot-dip galvanizing on structures that meets or exceeds ASTM Standard A-123. The Design-Build Team shall provide galvanizing on hardware that meets or exceeds ASTM Standard A-153. Ensure that threaded material is brushed and retapped as necessary after galvanizing. Perform repair of damaged galvanizing that complies with the following:

Repair of Galvanizing _____ Article 1076-7

Standard Drawings for Metal Poles are available that supplement these project special provisions. These drawings are located on the Department's website:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

Comply with article 1098-1B “General Requirements” of the 2018 *Standard Specifications for Roads and Structures* for submittal requirements. The Design-Build Team shall provide shop drawings for approval. The Design-Build Team shall provide the copies of detailed shop drawings for each type of structure as summarized below. Ensure that shop drawings include material specifications for each component and identify welds by type and size on the drawing details, not in table format. Do not release structures for fabrication until shop drawings have been approved by NCDOT. The Design-Build Team shall provide an itemized bill of materials for all structural components and associated connecting hardware on the drawings.

Comply with article 1098-1A “General Requirements” of the 2018 *Standard Specifications for Roads and Structures* for Qualified Products List (QPL) submittals. All shop drawings shall include project location description, CCTV inventory number(s), and a project number or work order number on the drawings.

Summary of information required for metal pole review submittal:

<u>Item</u>	<u>Hardcopy Submittal</u>	<u>Electronic Submittal</u>	<u>Comments / Special Instructions</u>
<u>Sealed, Approved ITS Plan / Loading Diagram</u>	<u>1</u>	<u>1</u>	<u>All structure design information needs to reflect the latest approved ITS plans.</u>
<u>Custom Pole Shop Drawings</u>	<u>4 sets</u>	<u>1 set</u>	<u>Submit drawings on 11” x 17” format media. Show NCDOT project number and CCTV camera number in or above the title block.</u>
<u>Standard Pole Shop Drawings (from the QPL)</u>	<u>4 sets</u>	<u>1 set</u>	<u>Submit drawings on 11” x 17” format media. Show NCDOT project number and CCTV camera number in or above the title block.</u>
<u>Structure Calculations</u>	<u>1 set</u>	<u>1 set</u>	<u>Submit calculations on 8½” x 11” format media. Show NCDOT project number and CCTV camera number in the upper right corner of each page.</u>
<u>Standard Pole Foundation Drawings</u>	<u>1 set</u>	<u>1 set</u>	<u>Submit drawings on 11” x 17” format media. Submit a completed Standard Foundation Selection form for each pole using foundation table on Metal Pole Drawing M-8.</u>
<u>Custom Foundation Drawings</u>	<u>4 sets</u>	<u>1 set</u>	<u>Submit drawings on 11” x 17” format media. Show NCDOT project number and CCTV camera number in or above the title block.</u>
<u>Foundation Calculations</u>	<u>1</u>	<u>1</u>	<u>Submit calculations on 8½” x 11” format media. Show NCDOT project number and CCTV camera number in the upper right corner of each page.</u>
<u>Soil Boring Logs and Report</u>	<u>1</u>	<u>1</u>	<u>Report should include a location plan and a soil classification report including soil capacity, water level, hammer efficiency, soil bearing pressure, soil density, etc. for each pole.</u>

NOTE – All shop drawings and custom foundation design drawings shall be sealed by a professional Engineer licensed in the state of North Carolina. All geotechnical information shall be sealed by either a Professional Engineer or geologist licensed in the state of North Carolina. Include a title block and revision block on the shop drawings and foundation designs showing the NCDOT inventory number.

Shop drawings and foundation drawings may be submitted together or separately for approval. However, shop drawings shall be approved before foundations can be reviewed. Foundation designs will be returned without review if the associated shop drawing has not been approved. Incomplete submittals will be returned without review.

3.3 CONSTRUCTION METHODS

CCTV Metal Poles

Install anchor rod assemblies in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

Erect CCTV metal poles only after concrete has attained a minimum allowable compressive strength of 3,000 psi. For further construction methods, see construction methods for Metal Strain Pole.

Connect poles to grounding electrodes and bond them to the electrical service grounding electrodes.

For holes in the poles used to accommodate cables, install grommets before wiring pole or arm. Do not cut or split grommets.

Attach the hand hole covers to the pole by a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cover to hang clear of the opening when the cover is removed, and is strong enough to prevent vandalism. Ensure the chain or cable will not interfere with service to the cables in the pole.

Attach cap to pole with a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cap to hang clear of the opening when the cap is removed.

Perform repair of damaged galvanizing that complies with the 2018 *Standard Specifications for Roads and Structures*, Article 1076-7 “Repair of Galvanizing.”

Install galvanized wire mesh around the perimeter of the base plate to cover the gap between the base plate and top of foundation for debris and pest control.

Install a ¼-inch thick plate for concrete foundation tag to include: concrete grade, depth, diameter, and reinforcement sizes of the installed foundation.

Install CCTV metal poles, hardware, and fittings as shown on the manufacturer’s installation drawings. Install poles so that when the pole is fully loaded it is within two degrees of vertical.

Drilled Pier Foundations

Construct drilled pier foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

4. CCTV LOWERING SYSTEM

4.1 Description

A. CCTV Lowering System

Provide a CCTV lowering system for a digital, IP based camera as an integral part of the CCTV metal pole. The lowering system will consist of a support arm, camera connection box, and all necessary cabling and wiring for installation.

B. Portable CCTV Lowering System

Provide a portable CCTV lowering device to operate the lowering system.

4.2 Material

A. CCTV Lowering System

Provide a CCTV lowering system as an integral part of the CCTV metal pole. The lowering system will consist of a support arm, camera connection box, and all necessary cabling and wiring for installation of a digital, IP (Internet Protocol) based camera.

Ensure that the lowering device provides the electrical connections between the control cabinet and the equipment installed on the lowering device without reducing the function or effectiveness of the equipment installed on the lowering device or degrading the overall system in any way.

Locate the stainless-steel lowering cable inside conduit within the metal pole to avoid cable twisting and ensure that only the lowering cable is in motion inside the metal pole when the lowering device is operated. The cost to furnish and install this conduit is included in the cost of the metal pole with lowering device. Ensure that all other cables remain stable and secure during lowering and raising operations.

Provide the lowering device with a disconnect unit for electrically connecting the equipment installed on the lowering device's equipment connection box to the power, data, and video cables (as applicable); a divided support arm, and a metal pole adapter for the assembly's attachment to the metal pole.

All of the lowering device's external components must be made of corrosion-resistant materials that are powder-coated, galvanized, or otherwise protected from the environment by industry-accepted coatings that withstand exposure to a corrosive environment.

Ensure that the disconnect unit has a minimum load capacity of 200 pounds with a 4:1 safety factor. Fixed and movable components of the disconnect unit must have a locking mechanism between them. Provide a minimum of two mechanical latches for the movable assembly and, when latched, ensure that all weight is removed from

the lowering cable. Provide fixed unit with a heavy-duty cast tracking guide and a means to allow latching in the same position each time.

Provide a disconnect unit that securely holds the lowering device and the equipment installed on the lowering device. The interface and locking components must be stainless-steel or aluminum.

The lowering cable shall be a minimum diameter of 0.125 inch and constructed of 7 strands, 19 gauge, stainless-steel aircraft cable with a minimum breaking strength of 1,740 pounds. The contractor shall ensure that the prefabricated components for the lift unit support system preclude the lifting cable from contacting the power or video cables.

Provide a connector block as specified by the manufacturer or with the lowering device. The connector block shall be equipped with modular, self-aligning and self-adjusting female and male socket contact halves. The lowering device must be equipped with enough contacts to permit operation of all required functions of the camera. The lowering device connections must carry the signals, voltages, and current required by the device(s) connected to them under full load conditions. Submit documentation to the Engineer showing pin assignment.

The female socket contacts and the male contact halves must be of heavy-duty construction and the connector blocks made of molded synthetic rubber, molded chlorosulfonated polyethylene, polymer body or approved equal. The connector pins shall be made of brass or gold-plated nickel, or gold-plated copper. The current-carrying male and female contacts shall have a minimum diameter of 0.09 inch.

Provide cored holes in the rubber to create moisture-tight seals when mated with the male connector. All wire leads from both the male and female contacts shall be permanently molded in a body of chlorosulfonated polyethylene, or an approved equal. All current-carrying wires and signal wires shall be minimum #18 AWG stranded copper cable. All contacts shall be self-wiping with a shoulder at the base of each male contact so that it is recesses in the female block, thereby giving each contact a rain-tight seal when mated.

B. Portable CCTV Lowering System

Provide a portable CCTV lowering device to operate the lowering system. Provide a metal-frame lowering tool with winch assembly and a cable with a combined weight less than 35 pounds; a quick release cable connector, and an adjustable safety clutch. The lowering tool shall be powered using a half-inch chuck, variable-speed reversible industrial-duty electric drill to match the manufacturer-recommended revolutions per minute, or be supplied with a drill motor for the lowering tool.

The lowering tool shall support itself and the load. The lowering tool shall be equipped with a positive braking mechanism to secure the cable reel during raising and lowering operations, and to prevent freewheeling.

The lowering tool shall be equipped with gearing that reduces the manual effort required to operate the lifting handle to raise and lower a capacity load. It shall be provided with an adapter for operating the lowering device with the portable half-inch chuck drill using a clutch mechanism.

All lowering equipment, lowering device, pulleys, cables, etc. must be made of durable, corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to corrosive environment.

4.3 Construction Methods

A. CCTV Lowering System

Weights and/or counterweights shall be provided to assure the alignment for the camera connection can be raised into position without binding and that it can be lowered properly, unless otherwise approved by the Engineer. Ensure that the divided support arm and receiver brackets self-align the contact unit with the metal pole centerline during installation and that the contact unit cannot twist when subjected to the wind speed requirement as specified by the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 5th Edition, 2009, including the latest interim specifications. Supply internal conduit in the metal pole for the power and video cabling.

All pulleys installed for the lowering device and portable lowering tool must have sealed self-lubricated bearings, oil-tight bronze bearings, or sintered bronze bushings.

Provide 1.25-inch-diameter PVC conduit in the metal pole for the lowering cable. The contractor shall verify that a conduit mount adapter is furnished for the interface between the conduit and the internal back side of the lowering device.

~~HIGH DEFINITION CCTV METAL POLE AND FIELD EQUIPMENT~~

~~(6-17-15) (Rev. 9-8-17)~~

~~DB-08-04a~~

~~1. HIGH DEFINITION CCTV FIELD EQUIPMENT DESCRIPTION~~

~~The Design Build Team shall provide and install High Definition (1080p) CCTV field equipment described in these Project Special Provisions. Ensure equipment is fully compatible with all features of the existing VideoPro video management software currently in use by NCDOT in this Region.~~

~~Obtain approval of the camera locations and orientation from the Engineer prior to installing the CCTV camera assemblies.~~

~~1.2 MATERIAL~~

~~General~~

~~The Design Build Team shall provide and install new CCTV camera assemblies at the locations approved by the Engineer that consist of the following:~~

- ~~1. Dome CCTV camera that contains in a single enclosed unit the following:
 - ~~a. CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories~~
 - ~~b. Motorized pan, tilt, and zoom~~
 - ~~c. Pole mount camera attachment assembly.~~
 - ~~d. All necessary cable, connectors and incidental hardware to make a complete and operable system~~~~
- ~~2. Lightning arrestors installed in line between the CCTV camera and the equipment cabinet components.~~
- ~~3. A NEMA Type 4 enclosure constructed of aluminum with a clear acrylic dome or approved equal camera unit housing.~~

~~Camera and Lens~~

~~The Design Build Team shall provide new 1/4 inch charged coupled device (CCD) color day / night cameras. The Design Build Team shall provide cameras with automatic gain control (AGC) for clear images in varying light levels. The camera shall meet the following minimum requirements:~~

- ~~• Video signal format: NTSC compatible resolution, user selectable up to a maximum of 1920 x 1080 (1080p);~~
- ~~• Image sensor resolution: 768 horizontal pixels by 752 vertical pixels;~~
- ~~• Automatic gain control (AGC): 0-20 dB, peak average adjustable;~~
- ~~• White balance: Automatic through the lens with manual override;~~
- ~~• Electronic shutter: Dip switch selectable NTSC electronic shutter with speed range from 1/2 of a second (off) to 1/30,000 of a second (NTSC);~~
- ~~• Overexposure protection: Built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun;~~
- ~~• Gain control: Automatic and manual;~~
- ~~• Sensitivity: 1.5 lux at 90% scene reflectance;~~

- ~~Sync system: Internal AC line lock, phase adjustable using remote control, V-syne,~~
- ~~Signal to noise ratio: Greater than 50 dB,~~
- ~~Video output connection: 1 volt peak to peak, 75 ohms terminated, BNC connector, and~~
- ~~Primary voltage: 120 VAC,~~
- ~~Camera voltage: 24 VAC or 24 VDC, and~~
- ~~Camera power: 73 VA with heater at 24 VAC or 3A at 24 VDC.~~

~~Zoom Lens~~

~~The Design-Build Team shall provide each camera with a motorized zoom lens with automatic iris control with manual override and neutral density spot filter. The Design-Build Team shall provide lenses that meet the following optical specifications:~~

- ~~Automatic focus: Automatic with manual override,~~
- ~~Horizontal angle of view: 55.4 degrees at 3.6 mm wide zoom and 2.9 degrees at 82 mm telephoto zoom,~~
- ~~Focal length: 3.6 mm to 124 mm, 30X optical zoom, 12X electronic zoom,~~
- ~~Zoom Speed: 2.9, 4.2 and 5.8 seconds,~~
- ~~Lens aperture: Minimum of f/1.6,~~
- ~~Maximum Sensitivity at 30 IRE: .07 lux at 1/2 second color, .2 lux at 1/60 second black and white, .015 lux at 1/2 sec. black and white,~~
- ~~Preset positioning: Minimum of 128 presets.~~

~~The lens shall be capable of both automatic and remote manual control iris and focus override operation. The lens shall be equipped for remote control of zoom and focus, including automatic movement to any of the preset zoom and focus positions. The Design-Build Team shall provide mechanical or electrical means to protect the motors from overrunning in extreme positions. The operating voltages of the lens shall be compatible with the outputs of the camera control.~~

~~Camera Housing~~

~~The Design-Build Team shall provide new dome style enclosures for the CCTV assemblies. Equip housing with mounting assemblies for attachment to the pole mount. The enclosures shall be equipped with a sunshield and be fabricated from corrosion resistant aluminum and finished in a neutral color of weather resistant enamel. The enclosure shall meet or exceed NEMA 4X ratings. The viewing area of the enclosure shall be tempered glass.~~

~~Pan and Tilt Unit~~

~~Equip each new dome style assembly with a pan and tilt unit. The pan and tilt unit shall be integral to dome system. The pan and tilt unit shall be rated for outdoor operation, provide dynamic braking for instantaneous stopping, prevent drift, and have minimum backlash. The dome shall have an auto flip dome rotation to rotate and reposition camera for viewing objects passing below~~

~~camera. The Design Build Team shall provide electronic image stabilization. The pan and tilt units shall meet or exceed the following specifications:~~

- ~~• Pan: Continuous 360 degrees~~
- ~~• Tilt: +2 to -92 degrees minimum~~
- ~~• Presets: Minimum of 128 presets~~
- ~~• Preset accuracy: .1 degree~~
- ~~• Preset pan speed: .1 degrees / second to 200 degrees/second~~
- ~~• Preset tilt speed: .1 degrees / second to 400 degrees/second~~
- ~~• Privacy zones: Minimum of eight user configurable shapes~~
- ~~• Input voltage: 24 VDC or 24 VAC~~
- ~~• Motors: Two phase induction type, continuous duty, instantaneous reversing~~
- ~~• Preset Positioning: 64 PTZ presets per camera~~

Control Receiver / Driver

~~The Design Build Team shall provide each new camera unit with a control receiver / driver that is integral to the CCTV dome assembly. The control receiver / driver will receive serial asynchronous data initiated from a camera control unit, decode the command data, perform error checking, and drive the pan / tilt unit, camera controls, and motorized lens. As a minimum, the control receiver/drivers shall provide the following functions:~~

- ~~• Zoom in / out~~
- ~~• Automatic focus with manual override~~
- ~~• Tilt up / down~~
- ~~• Automatic iris with manual override~~
- ~~• Pan right / left~~
- ~~• Minimum 64 preset positions for pan, tilt, and zoom~~

~~In addition, each control receiver/driver shall accept status information from the pan / tilt unit and motorized lens for preset positioning of those components. The control receiver / driver will relay pan, tilt, zoom, and focus positions from the field to the remote camera control unit. The control receiver / driver shall accept "goto" preset commands from the camera control unit, decode the command data, perform error checking, and drive the pan/tilt and motorized zoom lens to the correct preset position. The preset commands from the camera control unit will consist of unique values for the desired pan, tilt, zoom, and focus positions.~~

CCTV Camera Attachment to Pole

~~The Design Build Team shall provide CCTV attachments that allow for the removal and replacement of the CCTV enclosure as well as providing a weatherproof, weather tight, seal that does not allow moisture to enter the enclosure.~~

~~The Design Build Team shall provide a CCTV camera attachment assembly that is able to support a minimum camera unit dead load of 45 pounds (20.4 kg).~~

Surge Suppression

~~Protect all equipment with metal oxide varistors connecting each power conductor to ground.~~

~~Protect coaxial cable from each camera by a surge protector at each end of the cable.~~

1.3 — CONSTRUCTION METHODS

General

~~Mount CCTV camera units 5' from the top of the pole or as directed by the Engineer. Position the camera to enable viewing traffic in all directions and as approved by the Engineer.~~

~~Mount CCTV cameras on the side of poles nearest intended field of view. Avoid occluding the view with the pole.~~

Electrical and Mechanical Requirements

~~Ground all equipment as called for in the Standard Specifications, these Special Provisions, and the plans developed by the Design-Build Team.~~

~~Install surge protectors on all ungrounded conductors entering the CCTV enclosure. House the protectors in a small, ventilated weatherproof cabinet attached near the CCTV attachment point in a manner approved by the Engineer.~~

2. — CCTV EQUIPMENT CABINET DESCRIPTION

~~The Design-Build Team shall provide 336 pole-mounted cabinets to house CCTV control and communications equipment. The cabinets shall consist of a cabinet housing, 19-inch EIA mounting cage, and power distribution assembly (PDA #3 as described in the CALTRANS TSCES).~~

~~The cabinet housing shall conform to sections 6.2.2 (Housing Construction), 6.2.3 (Door Latches and Locks), 6.2.4 (Housing Ventilation), and 6.2.5 (Hinges and Door Catches) of the CALTRANS TSCES. Do not equip the cabinet housings with a police panel.~~

~~The cabinet cage shall conform to section 6.3 of the CALTRANS TSCES.~~

~~Terminal blocks on the PDA #3 Assembly have internal wiring for the Model 200 switch pack sockets. Do not use terminal blocks on PDA #3 as power terminals for cabinet devices. Do not furnish cabinet with "Input Panels" described in section 6.4.7.1 of the TSCES. Do furnish cabinet with "Service Panels" as described in section 6.4.7.1 of the TSCES and as depicted on drawing TSCES 9 in the TSCES. Use service panel #2.~~

~~The Design-Build Team shall provide terminal blocks for power for cabinet CCTV and communications devices as needed to accommodate the number of devices in the cabinet.~~

~~Do not furnish cabinets with C1, C5, or C6 harness, input file, output file, monitor units, model 208 unit, model 430 unit, or switch packs.~~

~~The Design-Build Team shall provide all conduits, shelving, mounting adapters, and other equipment as necessary to route cabling, mount equipment, and terminate conduit in equipment cabinet.~~

~~2.2 — MATERIAL~~

~~Shelf Drawer~~

~~The Design-Build Team shall provide a pull-out, hinged-top drawer, having sliding tracks, with lockout and quick disconnect feature in the equipment cabinet. The Design-Build Team shall provide a pullout drawer that extends a minimum of 14 inches that is capable of being lifted to gain access to the interior of the drawer. Minimum interior dimensions of the drawer are to be one inch high, 13 inches deep, and 16 inches wide. The Design-Build Team shall provide drawers capable of supporting a 40-pound device or component when fully extended.~~

~~Cabinet Light~~

~~Each cabinet shall include two (2) fluorescent lighting fixtures (one front, one back) mounted horizontally inside the top portion of the cabinet. The fixtures shall include a cool white lamp, and shall be operated by normal power factor UL listed ballast. A door-actuated switch shall be installed to turn on the applicable cabinet light when the front door or back door is opened. The lights shall be mounted not to interfere with the upper door stay.~~

~~Surge Protection for System Equipment~~

~~Each cabinet shall be provided with devices to protect the CCTV and communications equipment from electrical surges and over-voltages as described below.~~

~~Main AC Power Input~~

~~Each cabinet shall be provided with a hybrid-type, power-line surge protection device mounted inside the power distribution assembly. The protector shall be installed between the applied line voltage and earth ground. The surge protector shall be capable of reducing the effect of lightning transient voltages applied to the AC line. The protector shall be mounted inside the Power Distribution Assembly housing facing the rear of the cabinet. The protector shall include the following features and functions:~~

- ~~• Maximum AC line voltage: 140 VAC.~~
- ~~• Twenty pulses of peak current, each of which shall rise in 8 microseconds and fall in 20 microseconds to ½ the peak: 20000 Amperes.~~
- ~~• The protector shall be provided with the following terminals:
 - ~~○ Main Line (AC Line first-stage terminal).~~
 - ~~○ Main Neutral (AC Neutral input terminal).~~
 - ~~○ Equipment Line Out (AC line second state output terminal, 19 amps).~~
 - ~~○ Equipment Neutral Out (Neutral terminal to protected equipment).~~
 - ~~○ GND (Earth connection).~~~~
- ~~• The Main AC line in and the Equipment Line out terminals shall be separated by a 200 Microhenry (minimum) inductor rated to handle 10 AMP AC Service.~~

- ~~• The first stage clamp shall be between Main Line and Ground terminals.~~
- ~~• The second stage clamp shall be between Equipment Line Out and Equipment Neutral.~~
- ~~• The protector for the first and second stage clamp shall have an MOV or similar solid state device rated at 20 KA and shall be of a completely solid state design (i.e., no gas discharge tubes allowed).~~
- ~~• The Main Neutral and Equipment Neutral Out shall be connected together internally and shall have an MOV similar solid state device or gas discharge tube rated at 20 KA between Main Neutral and Ground terminals.~~
- ~~• Peak Clamp Voltage: 350 volts at 20 KA. (Voltage measured between Equipment Line Out and Equipment Neutral Out terminals. Current applied between Main Line and Ground Terminals with Ground and Main Neutral terminals externally tied together).~~
- ~~• Voltage shall never exceed 350 volts.~~
- ~~• The Protector shall be epoxy encapsulated in a flame retardant material.~~
- ~~• Continuous service current: 10 Amps at 120 VAC RMS.~~
- ~~• The Equipment Line Out shall provide power to cabinet CCTV and communications equipment and to the 24V power supply.~~

Ground Bus

~~The Design-Build Team shall provide a neutral bus that is not connected to the earth ground or the logic ground anywhere within the cabinet. Ensure that the earth ground bus and the neutral ground bus each have ten compression type terminals, each of which can accommodate wires ranging from number 14 through number 4 AWG.~~

Uninterruptible Power Supply (UPS)

~~The Design-Build Team shall provide and install one rack mounted UPS in each new cabinet that meet the following minimum specifications:~~

Output

Output Power Capacity	480 Watts / 750 VA
Max Configurable Power	480 Watts / 750 VA
Nominal Output Voltage	120V
Output Voltage Distortion	Less than 5% at full load
Output Frequency (sync to mains)	57 – 63 Hz for 60 Hz nominal
Crest Factor	up to 5:1
Waveform Type	Sine wave
Output Connections	(4) NEMA 5-15R

Input

Nominal Input Voltage	120V
Input Frequency	50 / 60 Hz +/- 3 Hz (auto-sensing)
Input Connections	NEMA 5-15P
Cord Length	6 feet
Input voltage range for main operations	82 – 144V
Input voltage adjustable range for mains operation	75 – 154 V

Battery Type

~~Maintenance free sealed Lead Acid battery with suspended electrolyte, leak proof.~~

~~Typical recharge time _____ 2 hours~~

Communications & Management

~~Interface Port(s) _____ DB 9 RS 232, USB~~

~~Control panel _____ LED status display with load
_____ and battery bar graphs~~

Surge Protection and Filtering

~~Surge energy rating _____ 480 Joules~~

Environmental

~~Operating Environment _____ 32 - 104° F~~

~~Operating Relative Humidity _____ 0 - 95%~~

~~Storage Temperature _____ 5 - 113° F~~

~~Storage Relative Humidity _____ 0 - 95%~~

Conformance

~~Regulatory Approvals _____ FCC Part 15 Class A,
_____ UL1778~~

~~2.3 CONSTRUCTION METHODS~~

~~For each equipment cabinet installation, use stainless steel banding or other method approved by the Engineer to fasten cabinet to pole. Install equipment cabinets so that the height to the middle of the enclosure is four feet from ground level. No risers shall enter the top or sides of the equipment cabinet.~~

~~Install all conduits, condulets, and attachments to equipment cabinets in a manner that preserves the minimum bending radius of cables and creates water proof connections and seals.~~

~~Install a UPS in each cabinet and power all CCTV cameras from the UPS.~~

~~Install a level concrete technician pad measuring a minimum four inches thick, 24 inches wide and 36 inches long at the front door of the CCTV equipment cabinet.~~

~~3. CCTV METAL POLES~~

~~3.1 Description~~

~~A. CCTV Metal Poles~~

~~The Design Build Team shall provide and install CCTV metal poles, grounding systems, and all necessary hardware. The work covered by this special provision includes requirements for the design, fabrication, and installation of custom designed CCTV metal poles and associated foundations.~~

~~The Design-Build Team shall provide designs of completed assemblies with hardware that equals or exceeds AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition, 2013, including the latest interim specifications and latest interim revisions. The Design-Build Team shall provide assemblies with a round or near round (18 sides or more) cross-section, or a multi-sided cross-section with no less than six sides. The sides may be straight, convex, or concave.~~

~~**B. Drilled Pier Foundations**~~

~~Design, furnish and install foundations for CCTV metal poles with all necessary hardware in accordance with the plans and specifications.~~

~~Design all CCTV pole foundations using actual soil conditions at each pole location. Perform soil test in accordance with sub-section (1) Soil Test of this special provision.~~

~~Any additional costs associated with a non-standard site specific foundation including additional materials, labor and equipment will be considered incidental to the lump-sum bid for the entire project. All costs for the non-standard foundation design will also be considered incidental to lump-sum bid for the entire project.~~

~~Analysis procedures and formulas shall be based on AASHTO, ACI code and per FHWA manuals. Design methods based on engineering publications or research papers needs to have prior approval from NCDOT. The Department reserves the right to accept or disapprove any method used for the analysis.~~

~~Use a Factor of Safety of 1.33 for torsion and 2.0 for bending for the foundation design.~~

~~Foundation design for lateral load shall not exceed 1" lateral deflection at top of foundation.~~

~~Design all custom foundations to carry the maximum capacity of each metal pole.~~

~~When poor soil conditions are encountered which could create an excessively large foundation design, consideration may be given to allowing an exemption to the maximum capacity design. The Design-Build Team shall gain approval from the engineer before reducing a foundation's capacity. On projects where poor soil is known to be present, it is advisable that the Design-Build Team consider getting foundations approved before releasing poles for fabrication.~~

~~**Soil Test**~~

~~(a) General~~

~~Drilled piers are reinforced concrete sections, cast in place against in situ, undisturbed material. Drilled piers are of straight shaft type and vertical.~~

~~Some standard drilled piers for supporting poles with mast arms may require wing walls to resist torsional rotation. Based upon this provision and the results of the required soil test, a drilled pier length and wing wall requirement may be determined and constructed in accordance with the plans developed by the Design Build Team.~~

~~For non standard site specific poles, the Design Build Team selected pole fabricator will determine if the addition of wing walls is necessary for the supporting foundations.~~

~~(b) Soil Test Procedure~~

~~Perform a soil test at each proposed metal pole location. Complete all required fill placement and excavation at each signal pole location to finished grade before drilling each boring. Soil tests performed that are not in compliance with this requirement may be rejected and will not be paid. Drill one boring to a depth of 26 feet within a 25-foot radius of each proposed foundation.~~

~~Perform standard penetration tests (SPT) in accordance with ASTM D-1586 at depths of 1, 2.5, 5, 7.5, 10, 15, 20 and 26 feet. Discontinue the boring if one of the following occurs:~~

~~A total of 100 blows have been applied in any 2 consecutive 6-inch intervals,~~

~~A total of 50 blows have been applied with < 3 inch penetration.~~

~~Describe each CCTV pole location along the project corridor in a manner that is easily discernible to both the Design Build Team's designer and NCDOT reviewers. If a CCTV pole is at an intersection, label the boring the "Intersection of (Route or SR #), (Street Name) and (Route or SR #), (Street Name), _____ County, Signal Inventory No. _____". Label borings with "B- N, S, E, W, NE, NW, SE or SW" corresponding to the quadrant location within the intersection.~~

~~If the CCTV pole location is located between intersections, The Design Build Team shall provide a coordinate location and offset, or milepost number and offset. Pole numbers should be made available to the geotechnical drilling Contractor. Include pole numbers in the boring label if they are available. If they are not available, ensure the boring labels can be cross referenced to~~

~~corresponding pole numbers or pole locations. For each boring, submit a legible (hand written or typed) boring log signed and sealed by a licensed Geologist or Professional Engineer registered in North Carolina. Include on each boring the SPT blow counts and N values at each depth, depth of the boring, and a general description of the soil types encountered.~~

~~Borings that can't be easily related to their specific pole location will be returned to the Design Build Team for clarification, or if approved by the engineer, the foundation may be designed using the worst case soil condition obtained as part of this project.~~

Standard Foundation Determination

Use the following method for determining the Design N value:

$$N_{AVG} = \frac{(N@1' + N@2.5' + \dots + N@Deepest\ Boring\ Depth)}{\text{Total Number of N values}}$$

$$Y = (N@1')^2 + (N@2.5')^2 + \dots + (N@Deepest\ Boring\ Depth)^2$$

$$Z = (N@1' + N@2.5' + \dots + N@Deepest\ Boring\ Depth)$$

$$N_{STD\ DEV} = \left[\frac{(\text{Total Number of N values} \times Y) - Z^2}{(\text{Total Number of N values}) \times (\text{Total Number of N values} - 1)} \right]^{0.5}$$

Design N value equals lesser of the following two conditions:

$$N_{AVG} - (N_{STD\ DEV} \times 0.45)$$

Or

$$\text{Average of First Four N Values} = \frac{(N@1' + N@2.5' + N@5' + N@7.5')}{4}$$

Note: If less than 4 N values are obtained because of criteria listed in Section 2 above, use average of N values collected for second condition. Do not include the N value at the deepest boring depth for above calculations if the boring is discontinued at or before the required boring depth because of criteria listed in Section 2 above. Use N value of zero for weight of hammer or weight of rod. If N value is greater than 50, reduce N value to 50 for calculations.

~~Submit completed boring logs collected in accordance with sub-section (1) Soil Test above along with pole loading diagrams to the Design Build Team selected pole fabricator to assist in the pole and foundation design.~~

~~If one of the following occurs, the Standard Foundations Chart shown on the plans developed by the Design Build Team may not be used and a non-standard foundation may be required. In such case, contact the Engineer.~~

~~The Design N-value is less than 4,~~

~~The drilled pier length, “L”, determined from the Standard Foundations Chart, is greater than the depth of the corresponding boring.~~

~~In the case where a standard foundation cannot be used, the Design Build Team shall be responsible for all additional design and construction costs associated with the non-standard foundation.~~

~~Foundation designs shall be based on level ground around the traffic signal pole. If the slope around the edge of the drilled pier is steeper than 8:1 (H:V) or the proposed foundation will be less than ten feet from the top of an embankment slope, the Design Build Team shall be responsible for providing slope information to the foundation designer and to the Engineer so it can be considered in the design and review, respectively.~~

~~The “Metal Pole Standard Foundation Selection Form” may be found at:~~

~~<https://connect.ncdot.gov/resources/safety/ITS%20and%20Signals%20Resources/Standard%20Foundation%20Selection%20Form.pdf>~~

~~If assistance is needed, contact the Engineer.~~

~~Non-Standard Foundation Design:~~

~~Design non-standard foundations based upon site-specific soil test information collected in accordance with sub-section (1) Soil Test above. Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges*. Use the computer software LPILE version 5.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Use the computer software gINT version 8.0 or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. The Design Build Team shall provide a drilled pier foundation for each pole with a length and diameter that result in a horizontal lateral movement of less than 1 inch at the top of the pier and a horizontal rotational movement of less than 1 inch at the edge of the pier. Submit any non-standard foundation designs including drawings, calculations, and soil boring logs to the Engineer for review and approval before construction. Foundations installed without prior approval may be rejected.~~

3.2 — MATERIALS

CCTV Metal Poles

The Design Build Team shall provide CCTV poles that are a minimum of 50 feet tall.

Fabricate CCTV metal pole from coil or plate steel to meet the requirements of

~~ASTM A 595 Grade A tubes. For structural steel shapes, plates and bars use A572 Gr 50 min or ASTM A709 Gr 50 min. The Design-Build Team shall provide poles that are round in cross-section or multisided tubular shapes and have a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single ply plate or coil so there are no circumferential weld splices. Galvanize in accordance with AASHTO M 111 and / or ASTM A 123 or an approved equivalent.~~

~~Ensure that allowable pole deflection does not exceed that allowed per 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition, and the latest Interim Specifications. Ensure that maximum deflection at the top of the pole does not exceed 2.5 percent of the pole height.~~

~~Use the submerged arc process or other NCDOT previously approved process suitable for poles to continuously weld pole shafts along their entire length. The longitudinal seam weld will be finished flush to the outside contour of the base metal. Ensure shafts have no circumferential welds except at the lower end joining the shaft to the pole base. In the event that a circumferential weld is necessary, prior approval is required from the Engineer and NCDOT Materials and Test Unit. The Design-Build Team shall provide welding that conforms to Article 1072-20 of the 2018 *Standard Specifications for Roads and Structures*, except that no field welding on any part of the pole will be permitted unless approved by a qualified engineer. Refer to Metal Pole Standard Drawing Sheets M2 through M5 for fabrication details. Fabricate anchor bases from plate steel meeting, as a minimum, the requirements of ASTM A 36M or cast steel meeting the requirements of ASTM A 27M Grade 485-250, AASHTO M270 Gr 36 or an approved equivalent. Conform to the applicable bolt pattern and orientation as shown on Metal Pole Standard Drawing Sheet M2.~~

~~Ensure all hardware is galvanized steel or stainless steel. The Design-Build Team shall be responsible for ensuring that the designer / fabricator specifies connecting hardware and / or materials that do not create a dissimilar metal corrosive reaction.~~

~~Unless otherwise required by the design, ensure each anchor rod is two-inch diameter and 60" length. The Design-Build Team shall provide ten-inch minimum thread projection at the top of the rod, and eight-inch minimum at the bottom of the rod. Use anchor rod assembly and drilled pier foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.~~

~~For each structural bolt and other steel hardware, hot dip galvanizing shall conform to the requirements of AASHTO M 232 (ASTM A 153). Ensure end caps for poles are constructed of cast aluminum conforming to Aluminum Alloy 356.0F.~~

~~The Design-Build Team shall provide a circular anchor bolt lock plate that will be secured to the anchor bolts at the embedded end with two washers and two nuts. The Design-Build Team shall provide a base plate template that matches the bolt circle diameter of the anchor bolt lock plate. Construct plates and templates from 1/4" minimum thick steel with a minimum width of four inches. Galvanizing is not required.~~

~~The Design-Build Team shall provide four heavy hex nuts and four flat washers for each anchor bolt. For nuts, use AASHTO M291 grade 2H, DH, or DH3 or equivalent material. For flat washers, use AASHTO M293 or equivalent material.~~

~~The Design-Build Team shall provide a two inch hole equipped with an associated coupling and weatherhead approximately five feet below the top of the pole to accommodate passage of CCTV cables from inside the pole to the CCTV camera.~~

~~The Design-Build Team shall provide a two inch hole equipped with an associated coupling and conduit fittings/bodies approximately 18 inches above the base of the pole accommodate passage of CCTV cables from the CCTV cabinet to the inside of the pole. Refer to Metal Pole Standard Drawing Sheet M3 for fabrication details.~~

~~The Design-Build Team shall provide a hand hole access with a watertight cover and have poles permanently stamped above the base hand hole with the identification tag details as shown on Metal Pole Standard Drawing Sheet M2.~~

~~For each pole, The Design-Build Team shall provide a 1/2 inch minimum thread diameter, coarse thread stud and nut for grounding which will accommodate #4 AWG ground wire. Ensure that the lug is electrically bonded to the pole and is conveniently located inside the pole at the hand hole.~~

~~The Design-Build Team shall provide a removable pole cap with stainless steel attachment screws for the top of each pole. Ensure that the cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to the pole with a sturdy chain or cable approved by the Engineer. Ensure that the chain or cable is long enough to permit the cap to hang clear of the pole top opening when the cap is removed.~~

~~After fabrication, have steel poles, required mast arms, and all parts used in the assembly hot dip galvanized per section 1076. Design structural assemblies with weep holes large enough and properly located to drain molten zinc during galvanization process. The Design-Build Team shall provide hot dip galvanizing on structures that meets or exceeds ASTM Standard A-123. The Design-Build Team shall provide galvanizing on hardware that meets or exceeds ASTM Standard A-153. Ensure that threaded material is brushed and retapped as necessary after galvanizing. Perform repair of damaged galvanizing that complies with the following:~~

~~Repair of Galvanizing ————— Article 1076-7~~

~~Standard Drawings for Metal Poles are available that supplement these project special provisions. These drawings are located on the Department's website:~~

~~<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>~~

~~Comply with article 1098-1B "General Requirements" of the 2018 *Standard Specifications for Roads and Structures* for submittal requirements. The Design-Build Team shall provide shop drawings for approval. The Design-Build Team shall provide the copies of detailed shop drawings for each type of structure as summarized below. Ensure that shop drawings~~

~~include material specifications for each component and identify welds by type and size on the drawing details, not in table format. Do not release structures for fabrication until shop drawings have been approved by NCDOT. The Design-Build Team shall provide an itemized bill of materials for all structural components and associated connecting hardware on the drawings.~~

~~Comply with article 1098-1A “General Requirements” of the 2018 *Standard Specifications for Roads and Structures* for Qualified Products List (QPL) submittals. All shop drawings shall include project location description, CCTV inventory number(s), and a project number or work order number on the drawings.~~

~~Summary of information required for metal pole review submittal:~~

Item	Hardcopy Submittal	Electronic Submittal	Comments / Special Instructions
Sealed, Approved ITS Plan / Loading Diagram	1	1	All structure design information needs to reflect the latest approved ITS plans.
Custom Pole Shop Drawings	4 sets	1 set	Submit drawings on 11" x 17" format media. Show NCDOT project number and CCTV camera number in or above the title block.
Standard Pole Shop Drawings (from the QPL)	4 sets	1 set	Submit drawings on 11" x 17" format media. Show NCDOT project number and CCTV camera number in or above the title block.
Structure Calculations	1 set	1 set	Submit calculations on 8 1/4" x 11" format media. Show NCDOT project number and CCTV camera number in the upper right corner of each page.
Standard Pole Foundation Drawings	1 set	1 set	Submit drawings on 11" x 17" format media. Submit a completed Standard Foundation Selection form for each pole using foundation table on Metal Pole Drawing M-8.
Custom Foundation Drawings	4 sets	1 set	Submit drawings on 11" x 17" format media. Show NCDOT project number and CCTV camera number in or above the title block.
Foundation Calculations	1	1	Submit calculations on 8 1/4" x 11" format media. Show NCDOT project number and CCTV camera number in the upper right corner of each page.
Soil Boring Logs and Report	1	1	Report should include a location plan and a soil classification report including soil capacity, water level, hammer efficiency, soil bearing pressure, soil density, etc. for each pole.

~~**NOTE**—All shop drawings and custom foundation design drawings shall be sealed by a professional Engineer licensed in the state of North Carolina. All geotechnical information shall be sealed by either a Professional Engineer or geologist licensed in the state of North Carolina. Include a title block and revision block on the shop drawings and foundation designs showing the NCDOT inventory number.~~

~~Shop drawings and foundation drawings may be submitted together or separately for approval. However, shop drawings shall be approved before foundations can be reviewed.~~

~~Foundation designs will be returned without review if the associated shop drawing has not been approved. Incomplete submittals will be returned without review.~~

~~3.3~~ ~~CONSTRUCTION METHODS~~

~~CCTV Metal Poles~~

~~Install anchor rod assemblies in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.~~

~~Erect CCTV metal poles only after concrete has attained a minimum allowable compressive strength of 3,000 psi. For further construction methods, see construction methods for Metal Strain Pole.~~

~~Connect poles to grounding electrodes and bond them to the electrical service grounding electrodes.~~

~~For holes in the poles used to accommodate cables, install grommets before wiring pole or arm. Do not cut or split grommets.~~

~~Attach the hand hole covers to the pole by a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cover to hang clear of the opening when the cover is removed, and is strong enough to prevent vandalism. Ensure the chain or cable will not interfere with service to the cables in the pole.~~

~~Attach cap to pole with a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cap to hang clear of the opening when the cap is removed.~~

~~Perform repair of damaged galvanizing that complies with the 2018 *Standard Specifications for Roads and Structures*, Article 1076-7 “Repair of Galvanizing.”~~

~~Install galvanized wire mesh around the perimeter of the base plate to cover the gap between the base plate and top of foundation for debris and pest control.~~

~~Install a ¼ inch thick plate for concrete foundation tag to include: concrete grade, depth, diameter, and reinforcement sizes of the installed foundation.~~

~~Install CCTV metal poles, hardware, and fittings as shown on the manufacturer’s installation drawings. Install poles so that when the pole is fully loaded it is within two degrees of vertical.~~

~~Drilled Pier Foundations~~

~~Construct drilled pier foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.~~

FAA NOTIFICATION OF CONSTRUCTION

The Design-Build Team shall adhere to the requirements of Title 14 of the Code of Federal Regulations (14 CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*, and Advisory Circular 70/7460-1L Change 2, *Obstruction Marking and Lighting*. The Design-Build Team shall submit a Notice of Proposed Construction or Alteration (Form 7460-1) prior to 60 days before planned construction through the Federal Aviation Administration (FAA) Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) portal found here:

<https://oeaaa.faa.gov/oeaaa/external/portal.jsp>

The Design-Build Team shall be responsible for all work and costs associated with the FAA forms and approvals required for construction of the project. This shall include, but is not limited to, preparation and submittal of forms 7460-1 and 7460-2. The electronic submittal portal, forms and instructions can be found at the website listed above.

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The Design-Build Team shall include both parties listed above in project status meetings including agendas, meeting minutes, and other stakeholder related communications throughout the project.

ROADWAY SCOPE OF WORK (1-3-2018)

1. General

- 1.1 Unless allowed otherwise in this RFP, roadway designs shall be in accordance with the following documents in order of precedence:
- (a) The requirements of this RFP;
 - (b) 2011 AASHTO A Policy on Geometric Design of Highways and Streets, 2013 Errata.
 - (c) NCDOT Roadway Design Manual, including all revisions effective on the Technical Proposal submittal date;
 - (d) 2018 NCDOT Standard Drawings, or as superseded by the detail sheets found at:

<https://connect.ncdot.gov/resources/Specifications/Pages/2018-Roadway-Standard-Drawings.aspx>

- 1.2 All pavement designs shall be in accordance with the Pavement Management Scope of Work found elsewhere in this RFP.
- 1.3 All limits of construction along the Mainline, Cross Streets, Service Roads and Ramps shall be of sufficient length to tie into existing conditions based upon the documents set forth in Section 1.1 of this Roadway Scope of Work.
- 1.4 Crown points and cross slopes along the Mainline, Cross Streets, Service Roads and Ramps shall be in accordance with the Hydraulics Scope of Work, found elsewhere in this RFP and with the documents set forth in Section 1.1 of this Roadway Scope of Work. The Hydraulics Scope of Work shall take precedence over the documents set forth in Section 1.1.
- 1.5 Unless otherwise noted in this RFP, the Design-Build Team shall design and construct the Mainline, all Cross Streets, Ramps, and Service Roads providing the same or better access, widening, improvements, and traffic measures of effectiveness, in the Department's sole discretion, included in the Preliminary Roadway Plans Provided by the Department.
- 1.6 Unless otherwise required in this RFP, all new curb and gutter along outside edge of pavement and within the Project limits shall be 2' – 6" curb and gutter in accordance with Standard #846.01 (*Roadway Standard Drawing for Concrete Curb, Gutter and Curb & Gutter*) of the 2018 *Roadway Standard Drawings*.
- 1.7 The Design-Build Team shall design and construct all medians within the Project limits as monolithic concrete islands in accordance with Standard #852.01 (*Roadway Standard Drawing for Concrete Islands*) and associated standard

drawings of the 2018 *Roadway Standard Drawings*. ~~Where required, curb and gutter along median edges shall be 1'-6"~~. Planted medians will not be permitted.

- 1.8 The Design-Build Team shall design and construct all Cross Streets and Service Roads such that the through movement is not required to change lanes throughout the Project limits except where tying into existing.
- 1.9 NSR / NCRR At-Grade Railroad Crossings with -Y- Lines:
 - (a) if any portion of the design and / or construction of the -Y- Lines comes within 10 feet of the centerline of the NSR / NCRR railroad tracks running parallel to the Mainline, the Design-Build Team shall upgrade the existing signals at such at-grade crossings.
- 1.10 A longitudinal zero percent grade along the roadway profile is acceptable under temporary conditions only. The final, permanent longitudinal grade shall be no less than 0.3%.
- 1.11 Throughout this Roadway Scope of Work, the following definitions shall apply:
 - (a) the term “**Mainline**” or “**-L- Line**” refers to US 70.
 - (b) the terms “**Cross Streets**” and “**-Y- Lines**” refers to the following streets:

Cross Streets (-Y- Lines) as shown on the Preliminary Roadway Plans	
R-5777A & B	U-5713
Day Star Lane (SRY21C2)	Garner Road (Y1)
Thurman Road (Y21)	Grantham Road (Y2)
Taberna Way (Y22)	Airport Road (Y3)
	Williams Road (Y4)
Note: The Design-Build Team is advised that the alignment names herein shown are for illustrative purposes only, not contractual and shown in accordance with the definition of Preliminary Roadway Plans. The Design-Build Team has the option to utilize the alignment names herein shown or use new alignment names that fit the need of its proposed designs.	

- (c) the term “**Service Roads**” refers to the following alignments shown in the Preliminary Roadway Plans:

Service Roads as shown on the Preliminary Roadway Plans	
R-5777A & B	U-5713
SRY21B	SR1
SRY21B2	SR2
SRY21AY22B	SR3_ALT
SRY22A	SR4
SRY21C	SR5
SRY21D	SR6

SRY22D	SR7
Note: The Design-Build Team is advised that the alignment names herein shown are for illustrative purposes only, not contractual and shown in accordance with the definition of Preliminary Roadway Plans. The Design-Build Team has the option to utilize the alignment names herein shown or use new alignment names that fit the need of its proposed designs.	

- (d) the term “**Ramps**” refers to the following alignments shown in the Preliminary Roadway Plans:

Ramps as shown on the Preliminary Roadway Plans	
R-5777A & B	U-5713
Y21RPA	RPAY2
Y21RPB	RPBY2
Y21RPC	RPCY2
Y21RPD	RPDY2
Y22RPA	RPAY3
Y22RPB	RPBY3
Y22RPC	RPCY3
Y22RPD	RPDY3
	RPAY4
	RPBY4
	RPCY4
	RPDY4
	RPA55
	RPB55
Note: The Design-Build Team is advised that the alignment names herein shown are for illustrative purposes only, not contractual and shown in accordance with the definition of Preliminary Roadway Plans. The Design-Build Team has the option to utilize the alignment names herein shown or use new alignment names that fit the need of its proposed designs.	

2. Preliminary Roadway Plans provided by the Department

- 2.1 Throughout this Roadway Scope of Work, any references to the Preliminary Roadway Plans shall include the following, in order of precedence:
- (a) the preliminary roadway plans with corresponding roadway profiles, roadway cross sections and typical cross sections for each alignment encompassing STIP Projects U-5713 and R-5777A & B provided by the Department; and
 - (b) the most recent public meeting maps provided by the Department.
- 2.2 Except were indicated in this Roadway Scope of Work, the Preliminary Roadway Plans are provided by the Department for reference only and shall not be a part of the Design-Build contract between the Design-Build Team and the Department. Any references to the Preliminary Roadway Plans throughout this Roadway Scope of Work are for illustrative purposes only and are not intended to be contractual.

The Department shall not be responsible for any omissions, errors, or any information shown or stated on the Preliminary Roadway Plans.

2.3 The Design-Build Team is allowed and encouraged to proposed modifications to the Preliminary Roadway Plans. Such proposed modifications by the Design-Build Team:

- (a) shall not reduce the posted speed limit of the Mainline;
- (b) shall fully comply with the Project commitments outlined in the Categorical Exclusion document for U-5713 / R-5777A & B provided by the Department;
- (c) shall not place the Cross Streets alignments over the Mainline, under any circumstances. Alternative Technical Concepts proposing Cross Street alignments over the Mainline will be rejected; and
- (d) shall comply with the interchange type set forth in Section 4.2 of this Roadway Scope of Work.

2.4 Modifications to the Roadway Preliminary Plans that are in compliance with items 2.3(a) through 2.3(d) shall not require the submittal of an Alternative Technical Concept, unless an Alternative Technical Concept is required due to deviations from the requirements included in other sections of this RFP.

2.5 Design Exceptions in the Preliminary Roadway Plans:

- (a) The Department is aware of the following design exceptions:

R-5777A & B	
Service Road -SR4- SR Y21AY22B-	PI Sta. 63+66.57 Design Speed = 25 mph
U-5713	
Service Road -SR4-	PI Sta. 25+68.10 Design Speed = 20 mph
Service Road -SR7-	PI Sta. 18+82.38 Design Speed = 20 mph
Service Road -Y3-	PI Sta. 27+30.29 Design Speed = 20 mph (stop condition)
Mainline -L- Northbound and Southbound	Distance between ramps in both directions, between Airport Road and Williams Road shall be no less than the distance shown in the Preliminary Roadway Plans.
Grantham Road -Y2-	Storage length for left turn movement into Service Road -SR1- shall be no less than 275 feet.

Ramp -RPAY4-	Minimum width of ramp inside shoulder shall be no less than 4 feet.
Ramp -RPBY4-	
Ramp -RPCY4-	

- (b) All design exceptions, whether included in Section 2.5(a) of this Roadway Scope of Work, or as proposed by the Design-Build Team that are not included in the list provided under Section 2.5(a), shall undergo the design exceptions process established by the Department.

3. Mainline Specifications

3.1 Mainline Project Limits:

- (a) The overall project limit on the south side of the Project is approximately one (1) mile east of Thurman Road, generally station 212+00 on the Preliminary Roadway Plans.
- (b) At the south end of the Project, the Department notes the following:
 - 1. The Mainline Project limit at the south end of the Project is Mainline station 245+00;
 - 2. the limit for Service Road -SRY21C- goes east to approximately Mainline station 217+80.00, beyond the Mainline project limit. The intent is to provide a continuation to the existing service road from approximately -SRY21C- station 10+00.00 to -SRY21C- station 20+00.00;
 - 3. the existing access apron between the existing service road and the Mainline, between Mainline stations 212+00 and 216+50, shall be removed; and
 - 4. the Design-Build Team shall mark the Project limit at the south end of the Project as Mainline station 212+00.
- (c) The overall project limit on the north side of the Project is approximately 0.7 mile north of Williams Road, generally station 155+00 on the Preliminary Roadway Plans.
- (d) The limit of construction along the ramps on the northern terminus of the project are as follows: for ramp -RPB55-, the project limit shall be approximately -RPB55- station 22+58.81. For ramp -RPA55-, the project limit shall be approximately -RPA55- station 22+54.55.

- 3.2 The Mainline shall be designed and constructed to meet a 60-mph design speed for a level urban freeway (in an urban area with right of way constraints) designed to interstate standards, except where as specified in this RFP. A maximum grade of 4% along the Mainline is allowable.

- 3.3 The width of mainline travel lanes throughout the length of the Project shall be 12 feet.
- 3.4 Mainline superelevation shall be designed and constructed in accordance with AASHTO *A Policy on Geometric Design of Highways and Streets*, Table 3-10b (Minimum Radii for Design Superelevation Rates, Design Speeds, and $e_{\max}=8\%$). The Design-Build Team shall provide all other design criteria in the Technical Proposal.
- 3.5 For the transition between segments R-5777A & B and U-5713 (between the Taberna Way and the Grantham Road interchanges, and around Garner Road), the Design-Build Team shall design and construct all appropriate transitions and taper lengths in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
- 3.6 To the extent practicable, all lane drops and / or lane additions shall be on the outside of the Mainline.
- 3.7 [Glare screens shall be installed as required by the NCDOT Design Manual. Methodology of installation shall be consistent with the design for the area \(i.e. guardrail mounted versus barrier mounted\).](#)
- 3.87 R-5777A & B:
 - (a) From the south project limit to Garner Road (R-5777A & B), the typical cross section for the Mainline consists of a four-lane divided facility with a 46-foot median, which shall be cable guiderail divided.
 - (b) For the transition between the proposed condition and the existing condition at the southern project terminus (between Mainline station 245+00.00 and Thurman Road), the Design-Build Team shall design and construct all appropriate transitions and taper length in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
 - (c) The total width for outside Mainline shoulders along segment R-5777A & B shall be 12 feet of clear, usable width. The 12 feet shall be measured from edge of the travelled way to either face of barrier or shoulder breakpoint.
 - (d) The total width for inside Mainline shoulders (median side) along segment R-5777A & B shall be six (6) feet of which 4 feet shall be full depth paved shoulder.
 - (e) All median features designed and constructed by the Design-Build Team shall be in accordance with all documents set forth in Section 1.1 of this Roadway Scope of Work.

- (f) The inside shoulder of the bridges carrying the Mainline over Thurman Road and Taberna Way shall be governed by the requirement set forth in Section 3.9(b) of this Roadway Scope of Work.

3.98 U-5713:

- (a) From Garner Road to the north project limit (U-5713), the typical cross section for the Mainline consists of a six-lane divided facility with a 22-foot paved median, which shall include a Type “T” double-faced concrete median barrier along the center.
- (b) The transition from the proposed condition at the north terminus of the project to the existing condition at the south approach of the Neuse River Bridge, for both the Mainline and ramps, shall be of sufficient length in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
- (c) The total width for outside Mainline shoulders along segment U-5713 shall be no less than 12 feet of clear, usable width. The 12 feet shall be measured from edge of the travelled way to either face of barrier or shoulder breakpoint.
- (d) The total width for inside Mainline shoulders along U-5713 shall be no less than 10 feet.
- (e) All median features designed and constructed by the Design-Build Team shall be in accordance with all requirements of this RFP, and with documents set forth in Section 1.1 of this Roadway Scope of Work.
- (f) The Department is aware that the distance between the interchanges of the Mainline with Airport Road and Williams Road, as shown on the Preliminary Roadway Plans, is not in compliance with the documents set forth in Section 1.1 of this Roadway Scope of Work. The Department notes that the Design-Build Team is not required to address this non-compliance. The Design-Build Team, however, shall not further reduce the distance between interchanges, ramps and ramp elements, beyond what is shown on the Preliminary Roadway Plans.
- (g) The Design-Build Team shall design and construct 12-foot auxiliary lanes, in both directions, between the interchanges of the Mainline with Airport Road and Williams Road, in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work. The minimum shoulder width along this segment shall be 12 feet in accordance with Section 3.8(c) of this Roadway Scope of Work.

3.10~~9~~ Mainline Bridges

- (a) The Design-Build Team shall design and construct the bridges carrying the Mainline over Thurman Road, Taberna Way, Grantham Road, Airport Road, and Williams Road in accordance with the Structures Scope of Work found elsewhere in this RFP.
- (b) The inside shoulder of the bridges carrying the Mainline over Thurman Road and Taberna Way shall be of sufficient width to accommodate future inside widening (toward the Mainline median) of a third 12-foot lane plus shoulder. Such future shoulders shall be designed and constructed in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work. However, at final completion the bridges carrying the Mainline over Thurman Road and Taberna Way shall provide pavement marking for the Mainline's two (2) through lanes in each direction. The future third lane and shoulder shall be considered and marked as shoulder.

3.11~~0~~ Mainline Access:

- (a) The Design-Build Team shall design and construct the Mainline as a full control of access facility.
- (b) All access from the Mainline onto existing or proposed service roads and / or properties within the Mainline project limits shall be removed.
- (c) In addition to the requirements of the preceding item 3.10(b), Mainline access at approximately Mainline stations 216+00.00, 227+35.00 and 240+25.00 shall be removed.
- (d) All median crossovers within the Mainline project limits shall be removed, including the median crossover at approximately Mainline station 240+25.00.
- (e) The at-grade intersection of the Mainline and Garner Road shall be removed and no access shall be provided from the Mainline onto Garner Road.

3.12~~+~~ Retaining Walls:

- (a) The Design-Build Team shall design and construct all required retaining walls along the Mainline, Ramps and Service Roads in accordance with the Structures Scope for Work found elsewhere in this RFP. Traffic protection for retaining wall shall be in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
- (b) The length and amount of retaining walls within the project limits shall depend the Design-Build Team's design.

- (c) The Design-Build Team shall design and construct all retaining walls a minimum of ten (10) feet inside the right of way. If an exception for the offset distance between the edge of the traveled way and the retaining wall or noise wall, as the case may be, is required, the Design-Build Team shall submit such design exception request to the Department and seek Department's acceptance for such design exception prior to its implementation.

4. Interchanges

- 4.1 The Design-Build Team shall design and construct interchanges at the following intersections along the Mainline:
 - (a) Thurman Road;
 - (b) Taberna Way;
 - (c) Grantham Road;
 - (d) Airport Road; and
 - (e) Williams Road.
- 4.2 The Design-Build Team shall design and construct all compact diamond interchanges (CDI).
- 4.3 Alternative Technical Concepts for different types of interchanges may be submitted.
- 4.4 Without exception, all interchanges shall be designed and constructed with the Mainline over the intersecting roadway. No Alternative Technical Concepts proposing any portion of the Mainline under an intersecting roadway will be accepted.
- 4.5 Ramps:
 - (a) The Design-Build Team shall design and construct all ramps in accordance with AASHTO *A Policy on Geometric Design of Highways and Streets*, Table 10-1 (Guide Values for Ramp Design Speed as Related to Highway Design Speed). The maximum longitudinal grade for ramps within the U-5713 segment shall be 7%. Ramps within the R-5777A & B segment shall comply with the documents set forth in Section 1.1 of this Roadway Scope of Work.
 - (b) The minimum storage length for all ramps (as defined in Section 9-1 of the NCDOT *Roadway Design Manual*) shall be the most conservative length of either the storage length required in the U-5713 & R-5777 A/B Traffic Operations Analysis Technical Memorandum or the length shown in the Preliminary Roadway Plans. In any case, the storage length shall be no less than the minimum required in Section 9-1 of the NCDOT *Roadway Design Manual*.

- (c) For single-lane ramps, the minimum width for ramp lanes shall be 16 feet.
- (d) In those areas where ramps have two (2) or more lanes, the minimum lane width shall be 12 feet.
- (e) Minimum width for ramp shoulders shall be 4 feet for inside shoulders and 8 feet for outside shoulders.

5. Service Roads

- 5.1 Unless specified elsewhere in this RFP, the minimum lane width for Service Roads shall be 14 feet, except where tying into existing, in which case the appropriate transition length and taper as required by the documents set forth in Section 1.1 of this Roadway Scope of Work shall be utilized.
- 5.2 All Service Roads shall consist of a two-lane cross section, with one lane in each direction, and 2'-6" curb and gutter.
- 5.3 All Service Roads within segment R-5777A & B shall be designed and constructed to meet a minimum speed of 30 mph, except where indicated in Section 2.5(a) of this Roadway Scope of Work. Within this segment, all superelevation along Service Roads shall be in accordance with AASHTO *A Policy on Geometric Design of Highways and Streets, Table 3-8 (Minimum Radii for Design Superelevation Rates, Design Speeds, and $e_{max}=4%$)*.
- 5.4 All Service Roads within segment U-5713 shall be designed and constructed to meet a minimum design speed of 25 mph, except where indicated in Section 2.5(a) of this Roadway Scope of Work. Within this segment, all superelevation along Service Roads shall be in accordance with AASHTO *A Policy on Geometric Design of Highways and Streets, Table 3-8 (Minimum Radii for Design Superelevation Rates, Design Speeds, and $e_{max}=4%$)*.
- 5.5 Service Road -SRY21C- (southeast quadrant of the Mainline / Thurman Road interchange): The construction limit for Service Road -SRY21C- starts approximately 0.5 mile east of the Mainline reconstruction limit.
- 5.6 Service Roads -SRY21B- and -SRY21B2- (southwest quadrant of the Mainline / Thurman Road interchange):
 - (a) This Service Road shall extend from Thurman Road south to approximately station 240+00.00 of the Mainline.
 - (b) At least one point of access shall be provided at each of the parcels within the length of the Service Road, and between the Mainline right of way and the North Carolina Railroad right of way.
 - (c) To the greatest extent possible, the design and construction of the Service Road shall avoid the wetlands shown on the Preliminary Roadway Plans.

- (d) This Service Road shall be designed and constructed to meet a minimum design speed of 50 mph. All superelevation along this Service Road shall be in accordance with AASHTO *A Policy on Geometric Design of Highways and Streets, Table 3-8 (Minimum Radii for Design Superelevation Rates, Design Speeds, and $e_{\max}=4\%$)*.
- 5.7 All service roads shall be designed and constructed so as to provide access to properties and side streets in accordance with NCDOT standards and guidelines.
- 5.8 Service Road Study:
- (a) The Design-Build Team shall conduct a Service Road Study to determine whether parcels that no longer have direct access will be provided access to the service roads or will become a total take.
 - (b) The Design-Build Team shall submit such Service Road Study to the Division Construction Engineer and Resident Engineer for review and approval prior to finalizing the designs.
 - (c) If the Design-Build Team demonstrates, to the Department's sole satisfaction, that additional service road(s) are required, the design and construction of the service road(s), including all associated NEPA requirements, will be paid for as extra work in accordance with Subarticle 104-8(A) of the NCDOT Standard Specifications for Roads and Structures.
 - (d) If the Design-Build Team's design and construction methods require additional service road(s), the design and construction of the service road(s), as well as associated NEPA requirements, shall be included in the Design-Build Team's lump sum bid for the entire project.
- 5.9 The following Service Roads shall, at a minimum, receive a 1.5" overlay with a typical normal section:
- (a) Service Road on the east side of, and running parallel to, US 70, between Garner Road and Grantham Road (approximately Mainline stations 17+00.00 to 50+00.00);
 - (b) Service Road on the east side of, and running parallel to, US 70, between Grantham Road and Airport Road (approximately Mainline stations 54+00.00 to 87+50.00);
 - (c) Service Road on the east side of, and running parallel to, US 70, between Airport Road and Williams Road (approximately Mainline stations 92+00.00 to 116+50.00); and
 - (d) Service Road on the east side of, and running parallel to, US 70, between SR 1915 (Oak Street) and SR 1139 (Plum Street), (approximately Mainline stations 130+00.00 to 147+00.00).

6. Cross Streets

- 6.1 Along segments that include one single lane in each direction, the minimum lane width for Cross Streets shall be 14 feet. Along segments that include two or more lanes in either direction, the minimum lane width for Cross Streets shall be 12 feet.
- 6.2 The Design-Build Team shall design and construct all cross streets to meet the following minimum design speeds:
- (a) Day Star Lane: 40 mph
 - (b) Thurman Road: 40 mph
 - (c) Taberna Way: 30 mph
 - (d) Garner Road: 40 mph
 - (e) Grantham Road: 40 mph
 - (f) Airport Road: 50 mph
 - (g) Williams Road: 50 mph
- 6.3 Day Star Lane:
- (a) The Design-Build Team shall remove and replace Day Star Lane. The new Day Star Lane shall be within the Department's right of way, except for the 300 feet closest to Old Cherry Point Road, where the new Day Star Lane shall align with the existing Gibbs Road centerline.
- 6.4 Thurman Road:
- (a) Reconstruction limits for Thurman Road shall be, at a minimum, the intersecting points with proposed Service Roads east and west of the Mainline.
 - (b) Between the intersecting points of Thurman Road with proposed Service Roads east and west of the Mainline, Thurman Road shall be designed and constructed with a minimum of two (2) through lanes in each direction and a raised median of variable width.
 - (c) At its eastern limit, past the intersecting point with proposed Service Roads -SRY21C- and -SRY21D-, Thurman Road shall transition from a 4-lane cross section to the existing 2-lane cross section. Such transition shall be of sufficient length to tie into existing and in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
 - (d) At the intersection of Thurman Road with the interchange ramps, turning lanes and channelization in the form of raised concrete islands shall be provided in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.

6.5 Taberna Way

- (a) The western reconstruction limit for Taberna Way shall be, at a minimum, the intersecting point with proposed Service Roads -SRY21AY22B- and -SRY22A-.
- (b) The eastern reconstruction limit for Taberna Way shall be Old Cherry Point Road. The new alignment of Taberna Way east of the Mainline shall connect with Old Cherry Point Road. This new intersection with Old Cherry Point Road does not need to include turning lanes, unless specifically requested by the Department.
- (c) Between the intersecting points of Taberna Way with proposed Service Roads east and west of the Mainline, Taberna Way shall be designed and constructed with a minimum of two (2) through lanes in each direction and raised median of variable width.
- (d) At its eastern limit, past the intersecting point with proposed Service Road -SRY22D-, Taberna Way shall transition from a 4-lane cross section to a 2-lane cross section. Such transition shall be of the length required by the documents set forth in Section 1.1 of this Roadway Scope of Work.
- (e) At the intersection of Taberna Way with the interchange ramps, turning lanes and channelization in the form of raised concrete islands shall be provided in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.

6.6 Garner Road

- (a) The existing intersection of the Mainline and Garner Road will be eliminated, including the existing paved median cross over on the Mainline shall be removed.
- (b) Garner Road, east and west of the Mainline shall be connected to the Service Roads.
- (c) Reconstruction limits for Garner Road east and west of the Mainline shall be limited to new intersections with Service Roads, as generally shown in the Preliminary Roadway Plans, and match the existing condition on Garner Road.

6.7 Grantham Road:

- (a) Reconstruction limit for Grantham Road west of the Mainline shall be at -Y2- station 12+00.00.

- (b) Reconstruction limit for Grantham Road east of the Mainline shall be the point of intersection with the proposed Service Road north of the Mainline (-SR7-).
- (c) Through the Mainline interchange, Grantham Road shall provide a minimum of two (2) through lanes in each direction.
- (d) At the intersection of Grantham Road with the interchange ramps, turning lanes and channelization in the form of raised concrete islands shall be provided in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
- (e) All transitions along Grantham Road from the proposed condition back into existing shall be of sufficient length to tie into existing and in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.

6.8 Airport Road:

- (a) Reconstruction limit for Airport Road west of the Mainline shall be approximately at -Y3- station 8+60.00.
- (b) Reconstruction limit for Airport Road east of the Mainline shall be its intersection with Old Cherry Point Road. The Design-Build Team shall be required to install appropriate signage at the intersection of Airport Road and Old Cherry Point Road, however, the Design-Build Team is not required to reconstruct or reconfigure the entire intersection, except where indicated (i.e. the west leg, or Airport Road leg, of the intersection with Old Cherry Point Road). The Design-Build Team is not required to add turning lanes to Old Cherry Point Road, unless specifically requested by the Department. In the event the Department requests turning lanes at the intersection of Old Cherry Point Road with Airport Road, such revisions to the plans, along with any additional studies required shall be paid by the Department as extra work in accordance with Subarticle 104-8(A) of the NCDOT Standard Specifications for Roads and Structures.
- (c) Between the proposed Service Road west of the Mainline, going across the Mainline, and continuing to Old Cherry Point Road east of the Mainline, Airport Road shall provide two (2) through lanes in each direction.
- (d) West of the Mainline, from the proposed Service Road going west to Airport Road's reconstruction limit approximately at -Y3- station 8+60.00, Airport Road shall transition into existing. Such transition shall be of sufficient length to tie into existing and shall be in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.

- (e) At the intersection of Airport Road with the interchange ramps, turning lanes and channelization in the form of raised concrete islands shall be provided in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.

6.9 Williams Road:

- (a) Reconstruction limit for Williams Road west of the Mainline shall be approximately at -Y4- station 11+18.00.
- (b) Reconstruction limit for Williams Road east of the Mainline shall be its intersection with Old Cherry Point Road. The Design-Build Team shall be required to install appropriate signage at the intersection of Williams Road and Old Cherry Point Road, however, the Design-Build Team is not required to reconstruct or reconfigure the entire intersection except where indicated (i.e. the west leg, or Williams Road leg, of the intersection with Old Cherry Point Road). The Design-Build Team is not required to add turning lanes to Old Cherry Point Road, unless specifically requested by the Department. In the event the Department requests turning lanes at the intersection of Old Cherry Point Road with Williams Road, such revisions to the plans, along with any additional studies required shall be paid by the Department as extra work in accordance with Subarticle 104-8(A) of the NCDOT Standard Specifications for Roads and Structures.
- (c) Between the proposed Service Road west of the Mainline, going across the Mainline, and continuing to Old Cherry Point Road east of the Mainline, Williams Road shall provide a minimum of two (2) through lanes in each direction.
- (d) West of the Mainline, from the proposed Service Road going west to Williams Road's reconstruction limit approximately at -Y4- station 11+18.00, Williams Road shall transition into existing. Such transition shall be of sufficient length to tie into existing and shall be in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
- (e) At the intersection of Williams Road with the interchange ramps, turning lanes and channelization in the form of raised concrete islands shall be provided in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.

6.10 Elder Street:

- (a) The existing access from Elder Street into the northbound lanes of the Mainline (i.e. pavement between Plum Street and the Mainline providing access onto Elder Street) shall be removed.

- (b) East of the Mainline, Elder Street shall end at its intersection with Plum Street. No work on Elder Street shall be required on the west side of the Mainline.
- (c) No bridge carrying the Mainline over Elder Street will be required at this location. The Design-Build Team may design and construct the Mainline to match the existing US 70 vertical alignment at this location.

7. Pedestrian Accommodations

- 7.1 All existing sidewalk impacted by the Project shall be replaced in kind and in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work.
- 7.2 Without exception, the following Cross Streets must include sidewalk along both sides:
 - (a) Grantham Road;
 - (b) Airport Road; and
 - (c) Williams Road.
- 7.3 Alternative Technical Concepts that eliminate sidewalks at the locations stated in Item 7.2 will be rejected.
- 7.4 All new sidewalk within the Project limits shall only be added at those locations shown on the Preliminary Roadway Plans, and shall be designed and constructed in accordance with the documents set forth in Section 1.1 of this Roadway Scope of Work. All new sidewalk shall have a minimum width of 5 feet plus a 2-foot utility strip between the sidewalk and back of curb. [Berm widths for sidewalk areas shall be the 10-foot standard width.](#)
- 7.5 Sidewalk transitions, from proposed sidewalk width to existing sidewalk width, shall be a minimum of 50 feet.

8. Additional Requirements

- 8.1 Due to right of way constraints, the Design-Build Team will be allowed to design and construct minimum ditch widths for the facility functional classification.
- 8.2 Unless noted otherwise elsewhere in this RFP, all bridge rail offsets shall be the greater of 1) the bridge rail offset as indicated in the NCDOT Roadway Design Manual, 2) the approach roadway paved shoulder width, or 3) the offset required to achieve stopping sight distance (maximum 12-foot). Narrower bridge rail offsets based on bridge length will not be allowed.
- 8.3 For all intersection design modifications, the Design-Build Team shall provide a traffic analysis that adheres to the July 1, 2015 NCDOT Congestion Management Capacity Analysis Guidelines for the Department's review and acceptance.

- 8.4 At all intersections with restricted movements impacted by the Design-Build Team's design and / or construction methods, excluding resurfacing or overlays, the Design-Build Team shall provide five-inch keyed-in concrete monolithic channelization islands, regardless of the island dimensions. (Reference Roadway Standard Drawing No. 852.01.)
- 8.5 The mainline is a full control of access facility. The Design-Build Team shall bring to the Division's attention any deviations from the proposed control of access shown on the Preliminary Roadway Plans provided by the Department. The proposed right of way and / or control of access limits may deviate in proximity to cultural, historic, or otherwise protected landmarks, including cemeteries, to eliminate / minimize impacts. Prior to negotiating right of way, easement and / or control of access with property owners, the Department shall accept the Right of Way Plans developed by the Design-Build Team.
- 8.6 Prior to installation, the Design-Build Team shall be responsible for coordinating with, and obtaining approval from, the NCDOT for the control of access fence placement. The Design Build Team shall be responsible for installation of woven wire control of access fence as noted below:
 - (a) Throughout the construction limits, excluding areas that consist solely of pavement marking obliterations / revisions, the Design-Build Team shall remove and dispose of all existing control of access fence, and install new control of access fence.
 - (b) The Design-Build Team shall replace all control of access fence damaged during construction.
 - (c) The Design-Build Team shall install all missing control of access fence.
- 8.7 Except as required elsewhere in this RFP and / or to eliminate a design exception, the Design-Build Team shall not further impact any cultural, historical or otherwise protected landmark or topographic feature beyond that shown on the Preliminary Roadway Plans provided by the Department.
- 8.8 The Design-Build Team shall provide milled rumble strips along the mainline outside and median paved shoulders, including ramp and loop terminals, and acceleration, deceleration and auxiliary lanes, in accordance with the NCDOT Roadway Standard Drawings No. 665.01.
- 8.9 For all bridges, the Design-Build Team shall submit vertical and horizontal clearance design calculations at all critical points. The Design-Build Team shall submit post construction survey points for the aforementioned critical points that verify construction adhered to the vertical and horizontal clearances accepted by the Department. The Design-Build Team shall be responsible for all costs associated with correcting vertical and horizontal clearances resulting from any construction variation from the design accepted by the Department.

9. Noise Abatement

The Department will provide an approved Traffic Noise Report (TNR~~A~~) and associated Preliminary Noise Wall Recommendation Memorandum that is based on the Department's preliminary design. The Design-Build Team shall evaluate the entire Project and develop the Design Noise Report (DNR) based on the plans developed by the Design-Build Team, regardless of changes to the Department's preliminary design. The DNR shall be developed in accordance with the NCDOT 2016 *Traffic Noise Policy* and the NCDOT 2016 *Traffic Noise Manual*; and be reviewed and accepted by NCDOT. Unless noted otherwise elsewhere in this RFP, ~~T~~he Design-Build Team shall include all design and construction costs for all sound barrier walls required by the accepted DNR, as well as all costs associated with performing any additional geotechnical investigations necessary to design the foundations, in the lump sum price bid for the entire project. However, the Design-Build Team will not be required to include any designs associated with the proposed sound barrier walls in the Technical Proposal. Prequalification under Discipline Code 441 shall be required for the firm developing the DNR.

The Design-Build Team is cautioned that the TNR and Preliminary Noise Wall Recommendation Memorandum are provided to show the general location of potential walls. Thus, as with all information provided by the Department, the TNR and Preliminary Noise Wall Recommendation Memorandum are provided for informational purposes only and; the Department will not honor any requests for additional contract time or compensation for any variations between the approved TNR and the approved DNR.

The Department will ballot all benefited receptors to determine which sound barrier walls recommended in the accepted DNR will be constructed. The Design-Build Team shall (1) develop and provide the information required by the Department to complete the balloting process, and (2) attend and / or speak at all balloting meetings and workshops. The Department will require four months to complete the balloting process. The Department will not honor any requests for additional contract time or compensation for the sound barrier wall construction unless the aforementioned four-month timeframe is exceeded. If time were granted, it would only be for that time exceeding the four-month period, which shall begin on the date the Department accepts the DNR developed by the Design-Build Team. The Design-Build shall not construct any sound barrier walls until the balloting process has been completed by the Department.

In accordance with Subarticle 104-8(A) of the 2018 Standard Specifications for Roads and Structures, if the accepted DNR and balloting process require more than 350,000 square feet (sf) of sound barrier wall, the amount over 350,000 sf will be paid for as extra work at the unit price of \$40.00 per square foot. All work tasks required to design and construct the additional sound barrier walls, including but not limited to traffic control, pavement, drainage, concrete barrier, geotechnical investigation and earthwork shall be considered inclusive in the aforementioned unit price. The amount of extra work shall be determined by deducting all additional sound barrier wall square footage required as a result of horizontal and / or vertical alignment changes to the Preliminary Roadway Plans provided by the Department from the accepted DNR and balloting process sound barrier wall total square footage.

The Design-Build Team shall only credit the Department the construction cost of all sound barrier walls eliminated by the balloting process. The construction costs of all sound barrier walls eliminated solely by the balloting process shall be deducted from the lump sum amount bid for the entire project.

The Design-Build Team shall design and construct all proposed sound barrier walls to accommodate the future widening of one additional 12-foot lane and a six-foot buffer without requiring any relocations / adjustments. At all sound barrier walls, the Design-Build Team shall provide 1) a four-foot berm between the wall and fill / cut slopes steeper than 6:1 and 2) a parallel concrete ditch at locations where the final grade slopes toward the wall.

To satisfy the FHWA's Abatement Measure Reporting requirements, the Design-Build Team shall prepare and concurrently submit a summary of the sound barrier walls to be constructed on the project with the final sound barrier wall working drawings submittal. The Design-Build Team shall submit the sound barrier wall summary directly to the NCDOT Traffic Noise and Air Quality Group and include the information noted in Title 23 Code of Federal Regulations Part 772 Section 772.13(f), including but not limited to overall cost and unit cost per square foot.

10. Driveway Access

- 10.1 Excluding undeveloped properties and / or those properties identified as a total take, as determined by the Service Road Study, the Design-Build Team shall design and construct a minimum of one driveway per parcel.
- 10.2 The Design-Build Team shall design and construct all driveways in accordance with the most recent version of the NCDOT *Policy on Street and Driveway Access to North Carolina Highways*, and with the following minimum requirements:
 - (a) The Design-Build Team shall provide horizontal and vertical alignments for all driveways that require 100 feet or longer to tie to existing.
 - (b) Excluding grades required to tie to an existing limiting condition, the maximum driveway grade shall be 10.0%.
 - (c) For shoulder sections, the minimum driveway turnout for residential and commercial properties shall be 16'-0" and 24'-0", respectively, or the existing width, whichever is greater.
 - (d) For curb and gutter sections, the minimum driveway turnout for residential and commercial properties shall be 20'-0" and 28'-0", respectively, or the existing width, whichever is greater.

GEOTECHNICAL ENGINEERING SCOPE OF WORK (3-11-25-19)

GENERAL

All geotechnical data, tests, computations and supporting subsurface investigations and documentation submitted by the Design-Build Team shall be provided in English Units.

Obtain the services of a firm prequalified for geotechnical work by the NCDOT Geotechnical Engineering Unit at:

<https://www.ebs.nc.gov/VendorDirectory/default.html>

The prequalified geotechnical firm shall prepare foundation design recommendation reports for use in designing structure foundations, roadway foundations, retaining walls, sound barrier foundations, and overhead sign structure foundations, and temporary structures.

The Engineer of Record who prepares the foundation design recommendation reports shall be a Professional Engineer registered in the State of North Carolina who has completed a minimum of three geotechnical design projects of scope and complexity similar to that anticipated for this project using the load and resistance factor design (LRFD) method and in accordance with the latest edition of the AASHTO *LRFD Bridge Design Specification*.

The prequalified geotechnical firm shall also determine if additional subsurface information, other than that required and noted elsewhere in this RFP, is required based upon the subsurface information provided by the NCDOT and the final roadway and structure designs. If a determination is made that additional subsurface information is required; the Design-Build Team shall use a prequalified geotechnical firm to perform all additional subsurface investigation and laboratory testing in accordance with the current NCDOT Geotechnical Engineering Unit *Guidelines and Procedures Manual for Subsurface Investigations*. Submit additional information collected by the Design-Build Team to the Geotechnical Engineering Unit, via the Division Construction Engineer or designee, for review and acceptance. The Design-Build Team shall provide the final Subsurface Investigation report in electronic and hardcopy format to the NCDOT for its records.

Unless noted otherwise herein, the Design-Build Team shall design foundations (except for sign foundations), embankments, slopes, retaining walls, and sound barrier walls in accordance with the current edition of the AASHTO *LRFD Bridge Design Specifications*, NCDOT *LRFD Driven Pile Foundation Design Policy*, all applicable NCDOT Geotechnical Engineering Unit Standard Provisions, NCDOT *Structures Management Unit Manual* and NCDOT *Roadway Design Manual*. The NCDOT *LRFD Driven Pile Foundation Design Policy* is located on the NCDOT Geotechnical Engineering Unit's website at:

<https://connect.ncdot.gov/resources/Geological/Pages/default.aspx>

For *Geotechnical Guidelines For Design-Build Projects*, the Design-Build Team shall adhere to the guidelines located at the following website:

<https://connect.ncdot.gov/letting/Pages/Design-Build-Resources.aspx>

A minimum of 2 standard penetration test (SPT) shall be required per bent for all bent lengths of 50 feet or less. Additional SPT borings shall be required across the roadway typical section for each bent more than 50 feet long and the borings shall be spaced no greater than 50 feet apart. All borings for pile-supported bents shall be located within 25 feet of the centerline of each bent location to be counted for these minimum requirements. For structure sites with multiple bridges, borings may be performed between bridges along the bent projection provided the distance between any two borings does not exceed 50 feet. The Design-Build Team shall extend all borings to a depth of 15 feet or four foundation element diameters, whichever is greater, below the foundation element to show a complete subsurface profile. The Design-Build Team shall be responsible for obtaining the borings noted above for all bents where subsurface information is not sufficient or is warranted by variability in the geology unless the prequalified geotechnical firm submits documented justification that the subsurface investigation provided by the NCDOT is adequate for design purposes and the justification is acceptable to the Department. Any deviations to the requirements noted above shall require acceptance from the NCDOT Geotechnical Engineering Unit prior to the foundation design submittal.

The maximum spacing between borings for retaining walls and sound barrier walls shall be 200 feet, with a minimum of two borings; one at each end of the wall. Drill borings for retaining walls a minimum depth below the bottom of the wall equal to twice the maximum wall height. Boring depths for sound barrier walls shall be to a minimum depth below the bottom of the wall equal to the maximum wall height or to SPT refusal.

ADDITIONAL DESIGN REQUIREMENTS

A. Structure Foundations

- Support all bridge bents on deep foundations.
- Use ~~MSE~~-abutment walls for all bridge end bents.
- Moment slab barriers are required on top of all ~~MSE~~-abutment walls. Address possible differential settlement between the moment slab and the wall facing.
- ~~MSE~~-All retaining walls must ~~include an~~ be included in the aesthetics package as to be submitted for review and acceptance by the Division.

B. Roadway Foundations

- Unless noted otherwise herein, all unreinforced proposed fill slopes, shall be 3:1 (H:V) or flatter. Unless the slopes are designed with adequate reinforcement to provide the required stability, all proposed soil cut slopes shall be 3:1 (H:V) or flatter. Reinforced soil slopes shall only be used if 1) the NCDOT Geotechnical Standard Details 1803.1 and / or 1803.2 are applicable, or 2) detailed design calculations and a slope stability analysis are submitted for review and acceptance prior to construction.
- Reinforced soil fill slopes shall only be used to minimize impacts to existing structures, and / or cultural, historical or otherwise protected landmark or topographic features.

- Check the overall final condition stability of reinforced and non-reinforced earth slopes including bridge abutments. Include internal, external, compound, and global investigations in the overall stability check. Meet the following performance criteria for fills slopes, cut slopes, and bridge abutments constructed under this Contract:
 - Global stability calculations: minimum Safety Factor of 1.5 for bridge abutments
 - Global stability calculations: minimum Safety Factor of 1.3 embankment fills
 - Global stability calculations: minimum Safety Factor of 1.5 for cut slopes
 - Lateral squeeze calculations: minimum Safety Factor of 2.0
- Design and construct bridge approach fills such that no more than 1 inch of settlement occurs, measured at the back of the approach slab, from the time the approach slab is cast until the end of the 12-month warranty period. ~~Design roadway embankments such that no more than 2” of settlement is calculated from substantial completion to 15 years after substantial completion.~~
- Mitigate all unsuitable soils to the extent required to improve the stability of the proposed embankment or subgrade. Use any suitable material to backfill undercut areas except when employing shallow undercut in accordance with Section 505 of the NCDOT 2018 *Standard Specifications for Roads and Structures* which requires the use of Select Material, Class IV. For undercut backfilling in water, use Select Material, Class III.
- Proofrolling of subgrade with a 35-ton roller is required.

C. Ground Improvement Methods

Ground improvement techniques to mitigate long term settlement problems or to transfer the embankment load to a deeper bearing stratum are acceptable means to accelerate construction and minimize settlement. Design roadway embankments such that no more than 2” of settlement is calculated from substantial completion to 15 years after substantial completion.

All ground improvement techniques shall follow the current industry standard practices and the guidelines of *Geotechnical Engineering Circular No. 13 Ground Modification Methods Reference Manual FHWA publication FHWA-NHI-16-027 and FHWA-NHI-16-028* or *Geosynthetic Design and Construction Guidelines FHWA-HI-95-038*. For Geofoam design and construction, use the Geofoam Applications in the Design and Construction of Highway Embankments, Prepared for National Cooperative Highway Research Program (NCHRP) Project 24-11, Transportation Research Board of the National Academies, July, 2004 and Guideline and Recommended Standard for Geofoam Applications in Highway

Embankments, National Cooperative Highway Research Program (NCHRP) Report 529, Transportation Research Board of the National Academies, 2004.

- Submit ground improvement designs recommendations and calculations including the Geotechnical Instrumentation and Monitoring Plan to the NCDOT Geotechnical Engineering Unit for acceptance 30 days prior to beginning embankment construction. Only the following Ground Improvement Methods or combination of methods are allowed to improve the foundation soil conditions:
 - Excavation and replace with granular soils
 - Wick drains and/or surcharge and/or waiting periods
 - Lightweight fill – Lightweight Aggregate
 - Lightweight fill – foamed (cellular) lightweight concrete
 - Lightweight fill – expanded polystyrene (EPS Geofoam Blocks)
 - ~~Rigid Inclusions for Ground Improvement~~ — ~~Rigid inclusions~~ Column Supported Embankments (CSE) – Columns may consist of ~~drilled-in-place or driven piles~~ aggregate columns as defined in Chapter 5 of FHWA GEC 013, vibro concrete columns (VCC), controlled modulus columns (CMC), or ~~other elements suitable to the design application and all performance requirements~~ stiff piles as defined in 3.1.1 (first three paragraphs) of Chapter 6 of FHWA GEC 013. Helical Screw Piles are not allowed for ~~columns rigid inclusions~~. ~~If rigid inclusions are used~~ Aggregate columns must consist of coarse aggregate. A Load Transfer Platform (LTP) is required for CSEs, refer to FHWA GEC 013 Chapter 6-NHI-06-019 and 020 for design of the Load Transfer Platform (LTP).
- ~~A Geotechnical Instrumentation and Monitoring Plan (GIMP) is required to monitor settlement where ground improvement methods are used. Use automated sensing and data acquisition systems. See the Geotechnical Instrumentation and Monitoring Plan Special Provision for details. Submit the GIMP to NCDOT for along with the ground improvement designs.~~

D. Geotechnical Instrumentation and Monitoring Plan (GIMP)

- Include in the Geotechnical Instrumentation and Monitoring Plan (GIMP) a detailed program for monitoring settlement where ground improvement methods are used. Provide and monitor instrumentation starting at the beginning of structure / embankment construction to capture results and to compare with the predictions of the geotechnical design. Continue monitoring embankments and abutment walls until the project is substantially complete. Use a geotechnical firm to install inclinometers and piezometers with experience installing this type of geotechnical instrumentation on similar projects.

- Develop, implement, and maintain a GIMP to include the following information:
 - Instrument types to be used
 - Locations of each instrument
 - Installation procedures
 - Zone of influence for each instrument
 - Critical readings and frequency of readings
- Collect data at least once a week and record data on a website accessible by the Engineer.
- At a minimum, monitor the following parameters:
 - Settlement profile under each abutment wall at the end of the approach slab. Use a horizontal inclinometer to collect settlement profile data.
 - Pore water pressures except for embankments supported by stiff columns.
 - Vertical and horizontal movement and tilt of abutment walls measured at 5 points along each wall.
- Provide plan, profile, and cross section sheets showing the program instrumentation, including locations (X, Y, Z) of sensors, cables, and associated cabinets. Show sensor types, measurement ranges, and related data on the plans. Conduct a meeting to coordinate details of the monitoring program with NCDOT and program implementation staff.

DE. Permanent Retaining Wall Structures

- For design and construction of mechanically stabilized earth (MSE) retaining walls, refer to the NCDOT *Policy for Mechanically Stabilized Earth Retaining Walls* which can be found at the NCDOT Geotechnical Engineering Unit's website at:

<https://connect.ncdot.gov/resources/Geological/Pages/Products.aspx>

Limit transverse differential settlement for MSE walls to 1/200 from face of wall to back of strips. Where abrupt changes in settlement are anticipated, provide vertical slip joints.

Provide drainage for all walls and connect to a drainage feature.

- With the exception of walls covered by a Geotechnical Engineering Unit Standard Detail, design and construct permanent retaining walls in accordance with the applicable NCDOT Geotechnical Engineering Unit Project Special Provisions,

which can be provided upon request by the Design Build Team. Geotechnical Provisions and Notes can be found at the NCDOT Geotechnical Engineering Unit's website at:

https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Provisions_Notes.aspx

- Submit a wall layout and design for each retaining wall. The wall layout submittal shall include at least the following:
 - Wall envelope with top of wall, bottom of wall, existing ground, and finished grade elevations at incremental stations
 - Wall alignment with stations and offsets
 - Typical sections showing top and bottom of wall, drainage, embedment, slopes, barriers, fences, etc.
 - Roadway plan sheets showing the wall (half size)
 - Roadway cross sections sheets showing the wall (half size)
 - Traffic Control Plans showing the wall (half size)
- For project retaining walls requiring a design not covered by a Geotechnical Engineering Unit Standard Detail, the wall layout submittal shall also include the following:
 - Calculations for bearing capacity, global stability, and settlement
 - Details of conflicts with utilities and drainage structures
- Locate retaining walls at toes of slopes unless restricted by right of way limits. The Design-Build Team shall submit global stability calculations for slopes at retaining walls and obtain acceptance from the NCDOT prior to construction. All slopes behind walls shall be 4:1 (H:V) or flatter.
- Drainage over the top of retaining walls shall not be allowed. Direct runoff above and below walls away from walls, if possible, or collect runoff at the walls and transmit it away. Curb and gutter or cast-in-place single faced barrier with paving up to the wall shall be required when runoff cannot be directed away from the back or front of the wall. In accordance with the NCDOT *Roadway Design Manual* – Section 6-7A, Figure 3, the Design-Build Team shall design and construct a paved concrete ditch, with a minimum 12-inch depth, at the top of all retaining walls with slopes draining towards the wall, and a four-foot bench between the wall and fill / cut slopes steeper than 6:1 (H:V).

- Precast or cast-in-place coping shall be required for walls without a cast-in-place face with the exception of when a barrier is integrated into the top of the wall. Extend coping or cast-in-place face a minimum of 12 inches above where the finished or existing grade intersects the back of the wall.
- When using abutment retaining walls with deep foundations, the end bent deep foundation shall be designed and constructed with one of the following and include any lateral loading resulting from the pile deflection in the design of the MSE walls:
 - A single row of plumb piles with brace piles battered toward the wall
 - A single row of plumb piles with MSE reinforcement connected to the back of the cap
 - An integral abutment with a single row of plumb piles and no reinforcement connected to the back of the cap in accordance with FHWA GEC 11 pages 6-8 through 6-10
- All deep foundations for end bents with abutment retaining walls shall extend a minimum of ten feet below the retaining wall foundation or leveling pad.

DE. Temporary Structures

- Design temporary retaining structures, which include earth retaining structures and cofferdams, in accordance with current allowable stress design AASHTO *Guide Design Specifications for Bridge Temporary Works*, the *Temporary Shoring Standard Special Provision* found elsewhere in this RFP and the applicable NCDOT Project Special Provisions available upon request by the Design-Build Team. The only submittal required to use the standard sheeting design is the “Standard Shoring Selection Form”.
- Traffic control barrier on top of walls shall be in accordance with the NCDOT Work Zone Traffic Control Unit details available upon request by the Design-Build Team. If anchored barrier is required, then anchor the barrier in accordance with NCDOT 2018 Roadway Standard Drawing No. 1170.01.

ADDITIONAL CONSTRUCTION REQUIREMENTS

- The Design-Build Team shall investigate, propose, and submit proposed remedial measures to the NCDOT Geotechnical Engineering Unit for review and acceptance (prior to incorporating recommended remedial measures into the project) for any construction problems related to the following:
 - Foundations
 - Retaining walls
 - Sound barrier walls
 - Subgrades
 - Settlement

- Slopes
- Construction vibrations
- The prequalified geotechnical firm which prepares the foundation designs shall review and approve all pile driving equipment and criteria. After the prequalified geotechnical firm has approved these submittals, the Design-Build Team shall submit them to the NCDOT for review and acceptance prior to beginning construction. Hammer approvals shall be submitted prior to performing any pile driving and shall be performed using GRLWEAP Version 2010 or later.
- The prequalified geotechnical firm which prepares the original foundation designs shall be responsible for any necessary changes to the foundation designs revising analysis, recommendations, and reports as needed. All changes shall be based upon additional information, subsurface investigation and / or testing. Send copies of revised designs, including additional subsurface information, calculations and any other supporting documentation to the NCDOT for review and acceptance.
- The Design-Build Team shall be responsible for any damage and / or claim caused by construction, including but not limited to damage caused by vibration (see Article 107-14 of the NCDOT 2018 *Standard Specifications for Roads and Structures*). The Design-Build Team shall be responsible for deciding if any pre- and post-construction monitoring and inventories need to be conducted. Any monitoring and inventory work shall be performed by a prequalified consulting firm.
- Use Pile Driving Analyzer (PDA) testing on a minimum of two piles for each pile size and type for each bridge with driven piles using the approved hammer driving system for the pile. The two test piles shall not be located at the same bent. PDA test piles shall be spread out across the bridge to provide data across the entire bridge site. Drive criteria at each bent shall be based on the PDA test pile most representative of the conditions at the bent and shall be approved by NCDOT. PDA testing shall be performed during initial drive and as necessary for re-strikes of the tested pile. Changes in hammer driving systems and / or additional similar hammer driving systems shall require additional PDA testing. Additional PDA testing may be warranted based on AASHTO *LFRD Bridge Design Specifications* and shall be recommended as needed by the geotechnical foundation design engineer and submitted to the NCDOT for review and acceptance.
- The PDA Consultant shall perform PDA testing, provide PDA reports, and develop pile driving inspection charts or tables. All recommendations shall be submitted to NCDOT for review and acceptance prior to driving any production piles at the applicable bridge.
- The geotechnical grade point shall be defined as the location where the proposed subgrade and natural ground intersect. At all geotechnical grade points, the Design-Build Team shall undercut the existing soils within two feet of the bottom of the proposed subgrade in accordance with the requirements below.

- The undercut shall extend along the profile to a point where the elevation difference from the bottom of the proposed subgrade to natural ground is greater than two feet, or to 25 feet on each side of the geotechnical grade point, whichever is less.
- The lateral extent of the undercut shall extend to a point where the elevation difference from the bottom of the proposed subgrade to natural ground is greater than two feet or to one foot outside of the paved shoulder / face of curb of the proposed roadway typical section, whichever is less.
- The base of the undercut shall parallel the proposed subgrade.
- Send copies of any inspection forms related to foundations, settlement, sound barrier walls, or retaining wall to the NCDOT for review and acceptance.

ITS SCOPE OF WORK (7-27-18)

GENERAL

Design, furnish, and install new ITS devices along the project. Remove and stockpile ITS devices impacted by the construction of this project. Integrate the new and relocated CCTVs and new DMS devices into the existing computer and network hardware and software at the NCDOT Division 2 Traffic Operations Center (TOC) **located at 1037 W.H. Smith Blvd, Greenville, NC 27835**, the Craven County 911 Center **located in New Bern**, and the Statewide Traffic Operations Center (STOC) located at 1636 Gold Star Drive, Raleigh, NC 27607. Major items of work include, but are not limited to, the following:

- Design, procurement, installation, integration and testing of five (5) New High Definition (IP Based) Closed Circuit Television Camera (CCTV) assemblies
- Removal and stockpiling of one (1) analog CCTV assembly and wireless radio communications equipment
- Design, procurement, installation, integration and testing of three (3) New Dynamic Message Signs (DMS) assemblies and supporting pedestal type structures
- Removal and stockpiling of one (1) DMS assembly and its supporting structure and wireless radio communications equipment
- Procurement and installation of junction boxes
- Design, procurement, and installation of power distribution system and equipment for each new ITS device including service poles
- Coordination with and procurement of Electrical service from appropriate power company including the required permits and inspections by “authorities having jurisdiction”, and the payment of permit fees and service-delivery charges
- Installation and testing of state-furnished Cellular Modems for each ITS device including installation of antenna and cabling assemblies.

Furnish and install guardrail to protect the ITS devices, as required.

Determine the location of each ITS device, obtain the Engineer’s approval of the locations, install and implement test procedures, and integrate the devices with the Division 2 Traffic Operations Center (TOC) **located at 1037 W.H. Smith Blvd, Greenville, NC 27835**, the Craven County 911 Center **located in New Bern**, and the Statewide Traffic Operations Center (STOC) located at 1636 Gold Star Drive, Raleigh, NC 27607.

Prior to any underground work, locate existing utilities, communications cable, power cable, and adjust work activities to protect these facilities. Immediately cease work and notify the Engineer and the affected owners if damage to existing utilities occurs. Repair damages to existing utilities, communications cable, and / or power cable at no cost to the Department.

Traveler information about conditions on the Neuse River and Trent River Bridges is vital to the safety of the motoring public. Therefore, 10 days prior to removal of the existing Front Access DMS near Williams Road, the Design-Build Team shall install and make operational a westbound CMS with a Department-furnished cell modem to perform the operations and functions of the removed DMS.

To provide advanced information about conditions within the construction limits, the westbound DMS in this project, proposed to be located east of the Thurman Road, shall be installed and made operational from the Division 2 TOC and from the STOC 30 days prior to the start of construction.

Perform all work in accordance with the *Dynamic Message Sign and High Definition CCTV Metal Pole With CCTV Lowering System ~~CCTV Metal Pole and Field Equipment~~* Project Special Provisions found elsewhere in this RFP, the 2018 NCDOT *Standard Specifications for Roads and Structures* and the 2018 NCDOT *Roadway Standard Drawings*.

Refer to the Traffic Signals and Signal Communications Scope of Work for additional ITS, ~~and fiber-optic~~ Signal eCommunication Plans, Junction Box and Conduit requirements.

INTERMEDIATE CONTRACT TIMES

Intermediate Contract Time #6 for Failure to Maintain Traveler Information for Westbound Traffic After the Existing DMS is Removed.

During construction, the Design-Build Team shall maintain traveler information for westbound traffic at location west of Williams Road after the existing DMS near Williams Road is removed. The Design-Build Team shall notify the Engineer a minimum of seven days prior to all proposed disruptions in their ability to maintain traveler information service.

Liquidated Damages for Intermediate Contract Time #6 for Failure to Maintain Traveler Information for Westbound Traffic After the Existing DMS is Removed are \$10,000.00 per day or any portion thereof.

STOCKPILING AND DISPOSAL OF ITS COMPONENTS

For purposes of this ITS scope, stockpile shall mean delivery of material to a location designated by the Engineer, and the Department retains ownership of the materials. Deliver stockpiled equipment to the NCDOT Division 2 Traffic Services Office *located at 1712 North Memorial Drive, Greenville, NC 27835*.

For purposes of this ITS scope, dispose shall mean the contractor takes ownership of the material and may salvage it or lawfully discard it according to the applicable laws governing the material.

The Design Build Team shall remove and stockpile the DMS assembly from Williams Road with its support structure and field equipment cabinet (including, but not limited to interior components) at the NCDOT Division 2 Traffic Services Office located at 1712 North Memorial Drive, Greenville, NC 27835.

The Design-Build Team shall remove and stockpile the analog CCTV assembly west of Williams Road with its field equipment cabinet (including, but not limited to, interior components like transceivers, media converters, encoders, and decoders) at the NCDOT Division 2 Traffic Services Office located at 1712 North Memorial Drive, Greenville, NC 27835.

Wireless radio components, antennas and repeaters shall be ~~preserved-inventoried~~ (i.e. brand, model, etc.) and tested in the presence of the engineer prior to being taken out of service. The same

equipment shall be preserved by the contractor for reuse at the new DMS and CCTV locations near Williams Road. The Design Build Team shall dispose of all removed DMS foundations and associated materials, all electrical service components/hardware, all camera poles, all repeater poles, and all electric service wood poles including associated hardware, guy assemblies and grounding materials.

DESIGN REQUIREMENTS

COMMUNICATIONS

Active Center-to-Field communication of new ITS devices will be thru NCDOT private cellular network and state-furnished cellular modems. Install state furnished cellular modems and antennas in each of the ITS device equipment cabinets.

Future center-to-field communications ~~of to~~ the new ITS devices will be over a fiber optic communications network. The Design Build Team shall ~~connect~~ route SMFO 12-fiber drop cable from the 144-fiber trunk cable (in the nearest junction box with a spliced enclosure) to each ~~all~~ new ITS devices along US 70 between the Williams Road and Taberna Way Interchanges Test the fiber optic connectivity of the 12-fiber drop cable from the splice enclosure's junction box to the device's field equipment cabinet. ~~to the new 144-fiber trunk cable with new 12-fiber drop cables. Provide and install a fiber optic splice center and field Ethernet switch in each device cabinet. After fiber testing, coil and cap 20 feet of 12-fiber drop cable in the junction box with the splice enclosure, and also coil and cap 20 feet of 12-fiber drop cable in each device's field equipment cabinet for future connectivity. Use a separate pair of fiber optic cable for each ITS device. Test fiber optic connectivity of device from both ends of the project. After testing, leave fiber optic jumpers between the patch panel and field ethernet switch disconnected in the cabinet for future connectivity.~~

CCTV CAMERAS

The Design-Build Team shall strategically locate and install five (5) new CCTV cameras on metal poles with lowering devices at a location and height which provide optimum viewing as defined in the *High Definition* ~~CCTV Metal Pole and~~ CCTV Metal Pole With CCTV Lowering System and Field Equipment Project Special Provision found elsewhere in this RFP.

Install one CCTV camera assembly at each of the following locations:

- Williams Road
- Airport Road
- Grantham Road
- Taberna Way
- Thurman Road

Furnish site surveys, including but not limited to bucket truck surveys or UAV (a.k.a. drone), to ensure camera coverage areas are acceptable, and provide information to the Engineer to obtain written approval. Determine the exact location of each CCTV camera, obtain the Engineer's

written approval of the locations, and install the cameras. All components required for the CCTV installations shall be new.

Share power service with nearby traffic signal and CCTV if feasible. If not feasible, install new electrical service equipment at each CCTV location. Furnish and install new CCTV equipment as defined in the *High Definition ~~CCTV Metal Pole and~~ CCTV Metal Pole With CCTV Lowering System and Field Equipment* Project Special Provision found elsewhere in this RFP. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Standard Specifications, the Project Special Provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer. Obtain all necessary permits, coordinate inspections, obtain approval of the installation, and pay all fees and construction costs including any utility company charges for service delivery.

Furnish and install new equipment cabinets as defined in the *High Definition ~~CCTV Metal Pole and~~ CCTV Metal Pole With CCTV Lowering System and Field Equipment* Project Special Provision found elsewhere in this RFP. All components required for the CCTV relocations shall be new.

DMS

The Design-Build Team shall strategically locate and install two (2) new pedestal mount DMSs. Furnish and install new DMS and associated equipment as defined in the *Dynamic Message Sign* Project Special Provision found elsewhere in this RFP.

Install one new DMS at each of the following locations:

- US 70 eastbound shoulder approximately 2 miles west of the Trent River Bridge
- US 70 westbound shoulder west of Williams Road ramps onto US 70.
- US 70 westbound shoulder approximately 5-7 miles east of Thurman Road

The DMSs installed under this project shall be selected from the most current version of the NCDOT ITS & Signals Qualified Products List.

Determine the exact location of the DMSs by coordinating with the Engineer. Obtain the Engineer's written approval of the locations and install the DMSs.

Install new electrical service equipment at all new DMS locations. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Standard Specifications, the Project Special Provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer. Obtain all necessary permits, coordinate inspections, obtain approval of the installation, and pay all fees and construction cost including utility company charge for service delivery.

MATERIALS & CONSTRUCTION

Furnish and install new materials and hardware that meet the requirements of the 2018 *NCDOT Standard Specifications for Roads and Structures* and this Scope of Work.

Furnish and install dynamic message signs from NCDOT 2018 Qualified Products List (QPL) to receive approval for use on the project. Catalog cuts will not be required for items on the QPL.

The QPL website is:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals-Qualified-Products.aspx>

CCTV CAMERAS

Install each CCTV camera on a new metal pole with a CCTV lowering system that can be operated manually and/or with a power tool.

Install the following minimum equipment in each CCTV equipment cabinet:

- Cellular modem and related equipment (e.g. antenna).
- Power equipment including power supplies, circuit breakers, surge protectors, and other related materials.
- Fiber optic cable interconnect center with patch panel and fiber optic jumpers
- Field Ethernet switch

In the CCTV equipment cabinet near Williams Road, the Design Build Team shall reestablish wireless radio communications with the Craven County 911 Center. Additional repeaters and system reprogramming may be needed.

Perform all work in accordance with the High Definition ~~CCTV Metal Pole~~ and [CCTV Metal Pole With CCTV Lowering System and](#) Field Equipment Project Special Provision found elsewhere in this RFP, the 2018 NCDOT Standard Specifications for Roads and Structures and the 2018 NCDOT Roadway Standard Drawings.

DYNAMIC MESSAGE SIGNS

Install DMSs on a single metal pedestal type structure with ladders, ladder safety cages, and walkways leading to the DMS maintenance access door. The bottom of each DMSs shall be 25 feet higher than the highest point of the roadway. Install DMS equipment in an approved equipment cabinet mounted on the structure. Install the following minimum equipment in each DMS equipment cabinet:

- Cellular modem and related equipment (e.g. antenna).
- DMS controller
- UPS and power equipment including power supplies, circuit breakers, surge protectors, and other related materials.
- Fiber optic cable interconnect center with patch panel and fiber optic jumpers
- Field Ethernet switch

In the DMS equipment cabinet near Williams Road, the Design Build Team shall reinstall the wireless radio system and reestablish wireless radio communications with the Craven County 911 Center. Additional repeaters and system reprogramming may be needed.

Perform all work in accordance with the *Dynamic Message Sign Project Special Provisions* found elsewhere in this RFP, the 2018 NCDOT *Standard Specifications for Roads and Structures* and the 2018 NCDOT *Roadway Standard Drawings*.

Integration and operation of new devices from the 911 Center will require the existing wireless radio system to be re-aimed and reprogrammed to receive signals from the new CCTV and DMS locations at or nearest to Williams Road. Additional repeaters may also be necessary to relay the signal to the existing wireless radio system. Accessing the existing antenna and radio system located on the bridge will require a bridge closure for the duration of reprogramming process. The Design Build Team will coordinate all bridge closures with the Division Traffic Engineer, the STOC and the 911 Center.

Reinstall the existing wireless radios and communications equipment at the Williams Road CCTV and the westbound DMS nearest to the Williams Road interchange. Configure and reestablish wireless radio communications with these new devices to the existing wireless radio system at the 911 Center.

JUNCTION BOXES

Furnish and install standard junction boxes (pull boxes) with all necessary hardware in accordance with Sections 1098-5 and 1716 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Provide standard junction boxes with minimum inside dimensions of 16”(l) x 10”(w) x 10”(d) for electrical service. Provide junction box covers with standard “Electric” logo, pull slots and stainless steel pins.

At each 12-fiber drop to the 144-fiber trunk cable that is on or along the shoulder of US 70, the Design-Build Team shall furnish and install new *Special Oversized Heavy Duty Junction Boxes with Steel Covers* that meet the requirements of Sections 1098-5 and 1716 of the 2018 NCDOT *Standard Specifications for Roads and Structures* and the **ASHTO H20 rating requirements** with minimum inside dimensions of 36”(l) x 24”(w) x 36”(d).

At each 12-fiber drop to the 144-fiber trunk cable that is **not** on or along the shoulder of US 70, the Design-Build team shall furnish and install new *Oversized Heavy Duty Junction Boxes with a Standard Cover* that meet the requirements of Sections 1098-5 and 1716 of the 2018 NCDOT *Standard Specifications for Roads and Structures* and the **ASHTO H20 rating requirements** with minimum inside dimensions of 30”(l) x 15”(w) x 24”(d).

Store 20’ of spare 12-drop cable in oversized heavy duty junction boxes and in ITS field equipment cabinets, as needed. Store a minimum of 30’ of spare 144-fiber trunk cable in special oversized heavy duty junction boxes, as needed.

WOOD POLES

Furnish and install wood poles, with all necessary grounding systems and hardware necessary in accordance with Section 1720 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Provide wood poles sized as necessary for the intended application.

Use 40' Class 4 wood poles for overhead electrical service drops.

Use 6" x 6" x 8' treated wood posts for underground electrical service.

Furnish and install related items of work including but not limited to risers with weatherhead or heat shrink tubing, guys, anchors and all necessary hardware in accordance with Section 1720 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

METAL POLES AND CCTV LOWERING SYSTEM

METAL POLES

~~Furnish~~ The Design-Build Team shall provide and install CCTV metal poles, with grounding systems and necessary hardware in accordance with the *High Definition CCTV Metal Pole With CCTV Lowering System and CCTV Metal Pole and Field Equipment Project Special Provision* found elsewhere in this RFP, the 2018 NCDOT *Standard Specifications for Roads and Structures* and the 2018 NCDOT *Roadway Standard Drawings*.

The work covered by this section includes requirements for the design, fabrication, and installation of custom-designed metal poles for CCTV cameras with camera lowering systems for IP (Internet Protocol) cameras, all with custom-designed foundations.

The Design-Build Team shall provide designs of the completed assemblies with hardware that equals or exceeds *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* 6th Edition, 2013 (hereafter called 6th Edition AASHTO), including the latest interim revisions.

Standard Drawings for metal poles and metal pole foundations are available on the Department's website:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

CCTV CAMERA LOWERING SYSTEM

The Design-Build Team shall provide a CCTV camera lowering system for a digital, IP based cameras as an integral part of the CCTV metal pole. The lowering system will consist of a support arm, camera connection box, and all necessary cabling and wiring for installation.

PORTABLE CCTV CAMERA LOWERING DEVICE

The Design-Build Team shall provide a portable CCTV lowering device to operate the lowering system manually (e.g. hand crank) and with a power tool.

ELECTRICAL SERVICE

Furnish and install new electrical services rated 100 Amps for overhead service or 200 Amps for underground service, 240/120 VAC service drops for the each new ITS device. Furnish and install related items of work, including, but not limited to standard size junction boxes, risers, guy assemblies, and wood poles with all necessary hardware in accordance with Section 1700 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. (Reference the Utilities Coordination Scope of Work found elsewhere in the RFP for additional coordination / approval requirements and payment responsibilities)

CODES AND STANDARDS

All ITS materials shall conform to the latest version of the applicable standards of the National Electrical Code (NEC), National Electric Manufacturer's Association (NEMA), the Underwriters' Laboratories, Inc. (UL), the Electronic Industries Association (EIA), the International Municipal Signal Association (IMSA), and the National Electrical Safety Code (NESC). All materials and workmanship must conform to the requirements of the NESC, standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI). Comply with all federal laws, state laws, and city codes in accordance with the 2018 NCDOT *Standard Specifications for Roads and Structures*.

Network equipment shall conform to the NCDOT and NC Statewide IT Policies and Standards as described at <http://it.nc.gov/statewide-resources/policies>. The architecture of the IT modules must be approved by NCDOT IT and the NC Office of Information Technology architecture groups.

SUBMITTALS

Submit a 60% set of preliminary plans and 100% set of project plans, including specifications for materials, catalog cuts, and installation and testing requirements for review and acceptance by the Department. A 100% set of plans and specifications shall be sealed and signed by a NC registered professional engineer. Acceptance of plans and specifications by the Department/ITS & Signals does not relieve the contractor of his/her responsibility and liability for inadequate or unacceptable designs. The registered engineer who is sealing and signing the plans and specification, along with his/her firm, is ultimately responsible for all designs and the construction resulting from the design plans and specifications. No construction of the ITS devices and / or communications cable shall begin until the Department/ITS Section has accepted the 100% plans and specifications. Provide the Department with a minimum of 10 working days for each review.

QUALIFIED PRODUCTS LIST

Submit a listing of items on the NCDOT 2018 Qualified Products List (QPL) to receive approval for use on the project. Catalog cuts will not be required for items on the QPL. The QPL website is:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals-Qualified-Products.aspx>

MAINTENANCE AND REPAIR REQUIREMENTS

The Design-Build Team shall maintain and repair all ITS components within the project scope, including but not limited to, ITS devices, ITS conduit system, and all related ITS components, from the beginning of construction until the final acceptance of the project by the NCDOT. After acceptance of the project, the Design-Build Team shall be responsible for repairing the system due to faulty materials or workmanship in accordance with the *Twelve Month Guarantee* Project Special Provision found elsewhere in this RFP, or longer if the Design-Build extends the aforementioned warranty period.

PLAN OF RECORD DOCUMENTATION

Prepare and submit to the Department Plan of Record (POR) documentation that depicts the conduit and ITS device locations. Submit final POR documentation in electronic and hard copy format for Department approval. Provide electronic plans in MicroStation (latest release in use by the Department) format on CD. Submit hard copy documentation on 22 x 34 inch plan sheets. POR documentation shall include the final location and depth of conduits, wiring external to the cabinets, locations of splice enclosures, junction box locations, and SMFO cable terminations. Include in the POR documentation real world coordinates for all ITS devices, splice enclosures, junction boxes, and equipment cabinets installed or utilized under this project. Provide the coordinates in feet units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83). Furnish coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used.

TESTING

Develop test plans and procedures for the new CCTV cameras and DMSs and all associated components and submit to the Engineer for review and approval.

Upon completion of the CCTV and DMS installations, conduct unit tests according to the approved test plan and procedures. Provide all necessary test equipment.

In case of failures and substandard performance, the Design-Build Team shall identify the cause, repair or replace the faulty parts and components and repeat the test. If the problem persists, the entire unit causing the problem shall be replaced prior to retest.

After successful completion of all unit tests, submit the test reports along with the record of repairs and part replacements to the Engineer.

After completion of all unit tests, a final system test shall be performed to prove and demonstrate the ability to access and operate all devices from the NCDOT Division 2 Traffic Operations Center (TOC) *located at 1037 W.H. Smith Blvd, Greenville, NC 27835*, the Craven County 911 Center *located in New Bern*, and the Statewide Traffic Operations Center (STOC) *located at 1636 Gold Star Drive, Raleigh, NC 27607*.

INTEGRATION

- A. Integration with STOC: This task will require configuration of the CCTV Camera and DMS application servers to add the new devices in the perspective applications' databases.

Program each devices' cellular communications parameter such as IP address in the applicable server and verify command and control from the operators' workstation. Coordinate these activities with the State ITS Operations Engineer, Steve Wardle, at (919) 825-2600.

- B. Integration with Division 2 TOC: This task will require configuration of the DMS application server to add the new DMSs in the application's databases. Program each DMS's cellular communications parameter such as IP address in the DMS server and verify command and control from the operators' workstation. Integration of the new CCTV cameras will consist of accessing each camera's web-interface using a state-approved web browser and adding the device URL to the Favorite folder. The description of the URL shall be the location of the camera. Coordinate these activities with the Division Traffic Engineer, Steve Hamilton, at (252) 439-2816.
- C. Integration with the Craven County 911 Center: There is no configuration or programming required at the 911 center as all the conditions are pre-existing. Verify command and control of affected devices to ensure correct configuration of field devices. Coordinate this work through the Division Traffic Engineer, Steve Hamilton

STRUCTURES SCOPE OF WORK (7-16-2018)

General

The Design-Build Team shall be responsible for the design, construction, and removal of all structures necessary to complete the project.

The Design-Build Team's primary design firm shall be on the Department's list of firms qualified for Structure Design and maintain an office in North Carolina.

Unless allowed otherwise in this RFP, designs shall be in accordance with the latest edition of AASHTO LRFD Bridge Design Specifications (with exceptions noted in the NCDOT *Structures Management Unit Manual*), NCDOT LRFD Driven Pile Foundation Design Policy, NCDOT *Structures Management Unit Manual* (including Policy Memos) and NCDOT *Bridge Policy Manual*.

Unless allowed otherwise in this RFP, all construction and materials shall be in accordance with the 2018 NCDOT *Standard Specifications for Roads and Structures*, NCDOT Structures Management Unit Project Special Provisions, and NCDOT Structures Management Unit Standard Drawings.

Alternate designs, details, or construction practices (such as those employed by other states, but not standard practice in NC) are subject to Department review and acceptance, and will be evaluated on a case by case basis.

Florida I-Beams (FIB), Prestressed Concrete Committee for Economic Fabrication (PCEF) girders, and Modified Bulb Tee girders will be allowed. However, designs and details will be subject to Department review and acceptance.

Project Details

Bridge and retaining wall structures at the following grade separations:

- Bridge No. 240293 on US70 over Williams Road (SR1167)
- Bridge No. 240294 on US70 over Airport Road (SR1131)
- Bridge No. 240295 on US70 over Grantham Road (SR1124)
- Bridge No. 240296 on US70 over Taberna Way (SR1922)
- Bridge No. 240297 on US70 over Thurman Road SR1116)

All proposed bridge barrier rails shall be per Standard Drawing CBR1.

All bridges shall meet the accepted roadway typical sections and grades. Bridge geometry (width, length, skew, span arrangement, etc.) shall be in accordance with the Structure Recommendations prepared by the Design-Build Team and accepted by the Department.

The minimum vertical clearance for bridges shall be 15'-6" except at Airport Road and Williams Road. The minimum vertical clearance ~~at Airport Road~~ shall be 17'-0" at Airport Road and 16'-0" at Williams Road.

The minimum horizontal clearance between edge of travel lane to barriers in front of walls under the ends of bridges shall be 14'-0". This requirement only applies under the proposed Mainline bridges.

Pedestrian lighting shall be wall mounted under each end of the following bridge sites:

- Williams Road (SR1167)
- Airport Road (SR1131)
- Grantham Road (SR1124)

For pedestrian lighting details, see Lighting Scope of Work.

The Design-Build Team shall design and construct all reinforced concrete box culverts required by the Design-Build Team's design.

The following will not be allowed on the project:

- Cored slab, box beam, fracture critical, deck girder and cast-in-place deck slab bridges
- Precast barrier rails
- Interior pile bents at roadway grade separations
- Monotube or cantilever DMS support structures
- Attachment of sign structures to bridge superstructures
- Bridge attachments in the overhang of roadway grade separations
- Casting of conduit in the bridge deck or outside barrier rail for roadway bridges
- Precast reinforced concrete box culverts
- [Shallow foundations behind MSE abutment walls](#)

Structure Removal

- Pedestrian Bridge (No.240250) over US70

Upon removal, the chain link fence, the six (6) light poles, and the lighting controller shall be salvaged from the structure site and remain the property of the Department. When salvaged materials are ready to be picked up by the Department, give three (3) days advance notice to Robert Corey at 252-514-4724.

TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS SCOPE OF WORK (~~7-27-183-28-~~
~~19~~)

I. GENERAL

The Design-Build Team shall design and prepare plans for the temporary traffic signal installations required by the construction phasing and / or detour routes, permanent traffic signal installations, traffic signal revisions, and signal communication plans for connection to the a new closed loop system. This work shall include, but not be limited to, the preparation of Traffic Signal Plans, Metal Pole Loading Diagrams, Electrical and Programming Details, Utility Make-Ready Plans, Signal Communication Fiber Optic Communication and Splicing Plans, Wireless Communication Plans, and Project Special Provisions. These plans shall be prepared in accordance with the *Design-Build Submittal Guidelines* and the *Guidelines for the Preparation of ITS & Signal Plans by Private Engineering Firms* available on the Design-Build Unit's website located at:

<https://connect.ncdot.gov/letting/Pages/Design-Build-Resources.aspx>

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience designing and sealing Traffic Signal and Signal Communications Plans for NCDOT on comparable projects. The Technical Proposal shall list projects, including description and similarity to the subject project, for which the PEF has developed Traffic Signal and Signal Communications Plans.

This project will affect the US 70 corridor in several locations. They are listed as follows:

- R-5777A/B: Signalization at the ramp termini resulting from proposed interchanges with US 70 will be upgraded, including US 70 Ramps at SR 1116 (Thurman Road) and US 70 Ramps at SR 1922 (Taberna Way)
- U-5713: Signalization at the ramp termini resulting from the proposed interchanges with US 70 will be upgraded, including US 70 Ramps at SR 1131 (Airport Road) and US 70 Ramps at SR 1167 (Williams Road). New signals will be constructed at SR 1124 (Grantham Road) at US 70 Ramps and SR 1167 (Williams Road) at SR 1113 (Old Cherry Point Road)

A pre-design meeting **shall** take place between the NCDOT ITS & Signals Unit, the Design-Build Team, Division Traffic Engineer, Regional Traffic Engineer, and any other pertinent NCDOT personnel. All Traffic Signal and Signal Communications Plan submittals shall be submitted for review to the NCDOT ITS & Signals Unit. All Traffic Signal and Signal Communications Plans shall be accepted by the ITS & Signals Unit prior to beginning traffic signal construction or plan implementation.

The Design-Build Team shall coordinate and implement all signal designs at the appropriate time as directed by the Engineer. Prior to final design and installation, the Design-Build Team shall coordinate all signal phasing recommendations with the Division Traffic Engineer, the Regional Traffic Engineer, and the NCDOT ITS & Signals Unit. Prior to placing traffic in a new pattern, all traffic signals shall be installed and operational, including but not limited to, signal system timing plans and interconnection to the Signal System, if required below.

Except as noted otherwise elsewhere in this RFP, the Design-Build Team shall maintain, monitor and adjust the traffic signals, both vehicle and pedestrian, as needed throughout the project construction. The Design-Build Team shall be responsible for the design and implementation of all temporary signal designs, including but not limited to signal system timing plans, needed to maintain vehicular and pedestrian traffic during construction, and all final traffic signal timing plans for the ultimate traffic configurations. If necessary, temporary traffic signal designs and implementation, shall include, but not be limited to, new local controller, signal timing, cables, poles, signal span, controllers, cabinets, and / or signal heads. Prior to implementation, all signal system timing plans shall be reviewed and accepted by the NCDOT ITS & Signals Unit.

Throughout the project construction, the Design-Build Team shall maintain full actuation of the traffic signals located within the project limits, unless allowed otherwise by the Engineer in writing.

To connect sidewalk networks, the Design-Build Team shall provide crosswalks and pedestrian signal heads for all approaches, as appropriate, based on field conditions. Crosswalks and pedestrian signal heads will not be required where there is no sidewalk.

Unless noted otherwise below, all new final signal installations shall utilize galvanized metal strain poles or metal poles with mast arms for support, based on the individual intersection designs. All temporary signal installations may utilize wood poles for signal supports. All plans and associated design material and specifications shall be reviewed and accepted by NCDOT before installation.

The Design-Build Team shall deliver all existing cabinets and their contents, including but not limited to fiber modems, telephone modems, radio equipment, that are not reinstalled on this project to the Division 2 Traffic Services Traffic Signal Department located at 236 South Glenburnie Rd., New Bern, NC 28560. The Design-Build Team shall dispose of and / or retain ownership of all other traffic signal equipment.

Signal Inventory Numbers (SIN) will be assigned for each new signalized location by the NCDOT ITS & Signals Unit. Once all the traffic signal locations have been finalized and accepted by the Department, the Design-Build Team shall submit a written request for the SINs to the NCDOT ITS & Signals Unit, via the ~~Design-Build Unit~~[Division](#). At a minimum, this request shall list each signal location that requires a SIN and include the following:

- County
- Nearest Municipality
- Names of all intersecting roads that will be under signal control, including state route numbers (Interstate, US, NC or SR) and common street names
- The dominant through movement

The Design-Build Team shall be responsible for providing a safe and economical design for the public. The Design-Build Team shall prepare all plans and designs in accordance with the current ITS & Signals Unit design standards, including but not limited to, the version of the following documents effective on the Technical Proposal submittal date:

- NCDOT *Standard Specifications for Roads and Structures*
- NCDOT *Standard Roadway Drawings*
- ITS & Signals Unit Project Special Provisions
- ITS & Signals Unit Design Manual
- *Manual on Uniform Traffic Control Devices (MUTCD)*
- *North Carolina Supplement to the Manual on Uniform Traffic Control Devices (NCMUTCD)*
- *Guidelines for the Preparation of ITS & Signal Plans by Private Engineering Firms*
- Traffic Systems Operations’ Project Special Provisions - (Special Provisions for the Preparation of Coordinated Traffic Signal System Timing Plans – Version 2011.1)

Links to additional ITS & Signals Unit design standards and aides are available on website noted below:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals.aspx>
<http://www.ncdot.gov/doh/preconstruct/traffic/ITSS/>

II. TRAFFIC SIGNALS

Unless allowed otherwise or elsewhere in this RFP, the Design-Build Team shall provide ~~two (2)~~ three (3) new traffic signals and modify four (4) existing traffic signals. All of these signals shall be interconnected as noted in the tables below. (Reference Section III for the system interconnection requirements.) The traffic signal detection for the final traffic patterns shall be multizone microwave detection. The Design-Build Team may provide video detection only for temporary traffic patterns during construction. Unless allowed otherwise elsewhere in this RFP, the required traffic signal work and signal communications for each intersection are listed below:

NCDOT- Proposed Signals		
Signal Inventory Number	Intersection Description	Work Requirements
02-0913 (New)	SR 1124 (Grantham Road) at US 70 Ramps	The Design-Build Team shall design and install a new, fully actuated traffic signal with 2070 controllers operating ASC/3 Software in a 170 cabinet with an auxiliary output file, including base extender. The Design-Build Team shall provide Flashing Yellow Arrow signal heads at all protected / permissive and permissive left turn movements, including time of day phasing options, as appropriate.
02-0914 (New)	SR 1167 (Williams Road) at SR 1113 (Old Cherry Point Road)	The Design-Build Team shall install new galvanized metal poles with mast arm(s) at this location.
<u>02-0919 (New)</u>	<u>SR 1167 (Williams Road) at Realigned -SR3 Alt- / Trent</u>	

	East Crossing Entrance.	The Design-Build Team shall provide crosswalks and pedestrian signal heads at each approach with existing or proposed sidewalk.
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NCDOT – Existing Signals		
Signal Inventory Number	Intersection Description	Work Requirements
02-0514 (Existing)	SR 1167 (Williams Road) at US 70 Ramps	The Design-Build Team shall modify existing traffic signals as needed to match all temporary construction phasing and the proposed final traffic patterns. This may require signal phasing changes, signal head changes, system detectors and / or system interconnection equipment.
02-0197 (Existing)	SR 1131 (Airport Road) at US 70 Ramps	The Design-Build Team shall design and install new, fully actuated traffic signals with 2070 controllers operating ASC/3 Software in a 170 cabinet with an auxiliary output file, including base extenders.
02-0779 (Existing)	SR 1922 (Taberna Way) at US 70 Ramps	The Design-Build Team shall provide Flashing Yellow Arrow signal heads at all protected / permissive and permissive left turns and U-Turn movements, including time of day phasing options, as appropriate. The Design-Build Team shall install new galvanized metal poles with mast arm(s).
02-0464 (Existing)	SR 1116 (Thurman Road) at US 70 Ramps	The Design-Build Team shall provide crosswalks and pedestrian signal heads at each approach with existing or proposed sidewalk.

III. SIGNAL COMMUNICATION PLANS

The Design-Build Team shall be responsible for designing, installing, and testing a **NEW Standalone Closed Loop Fiber Optic Communication System on an Ethernet Network** along US-70 in James City. The following signals will be included in the **NEW Standalone Closed Loop Fiber Optic Communication System**:

GRATHAM ROAD INTERCHANGE

SIN #02-0913 (New) - SR 1124 (Grantham Road) at US 70 Ramps

WILLIAMS ROAD INTERCHANGE

SIN #02-0514 (Existing) - SR 1167 (Williams Road) at US 70 Ramps

SIN #02-0914 (New) - SR 1167 (Williams Road) at SR 1113 (Old Cherry Point Rd.)

[SIN #02-0919 \(New\) - SR 1167 \(Williams Road\) at Realigned -SR3 Alt- / Trent East Crossing Entrance.](#)

AIRPORT ROAD INTERCHANGE

SIN #02-0197 (Existing) - SR 1131 (Airport Road) at US 70 Ramps

TABERNA WAY INTERCHANGE

SIN #02-0779 (Existing) - SR 1922 (Taberna Way) at US 70 Ramps

THURMAN ROAD INTERCHANGE

SIN #02-0464 (Existing) - SR 1116 (Thurman Road) at US 70 Ramps

The Design Build Team shall install a **SMFO NEW 144-fiber Trunk Cable** along US 70 between Williams Street and Taberna Way Interchanges and **SMFO NEW 12-fiber drop cables to the signals.**

JUNCTION BOXES

The Design-Build Team shall furnish and install new *Special Oversized Heavy Duty Junction Boxes with Steel Covers* along US 70 that meet the requirements of Sections 1098-5 and 1716 of the 2018 NCDOT *Standard Specifications for Roads and Structures* and the **ASHTO H20 rating requirements** with minimum inside dimensions of 36”(l) x 24”(w) x ~~24~~**36**”(d).

The Design-Build team shall furnish and install new *Oversized Heavy Duty Junction Boxes with a Standard Cover* between US 70 ~~to~~**at** the signal cabinets that meet the requirements of Sections 1098-5 and 1716 of the 2018 NCDOT *Standard Specifications for Roads and Structures* with minimum inside dimensions of 30”(l) x 15”(w) x 24”(d).

CONDUIT

The Design-Build Team shall furnish and install four (4) two-inch conduits and all necessary hardware, including tracer wire, junction box markers, and delineator markers by plowing, trenching, or directional drilling *along US 70*. [Conduits installed along US 70 and entering special oversized heavy junction boxes with steel covers shall enter and exit junction boxes at the same elevation through mouse holes on the side walls of the junction boxes and shall not enter through the bottom of the junction boxes. Submit typical drawings of the junction boxes with the conduit entrances for review prior to installation on the project.](#)

The Design-Build Team shall furnish and install two (2) two-inch conduits and all necessary hardware, including tracer wire, junction box markers, and delineator markers by plowing, trenching, or directional drilling along route *from US 70 to the signal cabinets*.

Furnish and install conduit in accordance with section 1715 of the 2018 NCDOT *Standard Specifications for Roads and Structures* for installing the fiber optic communications cable. Conduit shall not be placed in the median or under the roadway, except for lateral traverse crossings,

The Design-Build Team shall seal ALL [spare](#) conduits with duct plugs in junction boxes. Moldable duct plugs will not be allowed.

REMOTE ACCESS

The Design-Build Team shall design the New Standalone Closed Loop System with remote access by installing a cell modem in the signal cabinet at SR 1922 (Taberna Way) at US 70 Ramps. This location can be revised to a more optimal signal location during design.

[The Department will furnish all cellular modems. The Design Build Team shall request the modems through the Engineer at least six \(6\) weeks prior to scheduled installation.](#)

EXISTING WIRELESS SYSTEM

The Design-Build Team shall also be responsible for removal of the existing wireless system equipment along US 70 and delivering the equipment to the following location:

*NCDOT Division 2 Traffic Services Traffic Signal Department
236 South Glenburnie Rd.
New Bern, NC 28560
(252) 714 - 8253*

SIGNAL INV #	INTERSECTION	DESCRIPTION OF WORK
02-0913 (New)	SR 1124 (Grantham Road) at US 70 Ramps	Install new 12-fiber drop cable along one of the ramps from the new 144-fiber Trunk cable installed along US-70. Install fiber to the optical ports on the new Ethernet Edge Switch in the signal cabinet.
02-0514 (Existing)	SR 1167 (Williams Road) at US 70 Ramps	Install new 12-fiber drop cable along one of the ramps from the new 144-fiber Trunk cable installed along US-70. One 12-fiber drop cable shall be used for the two signals along Williams Street. Install fiber to the optical ports on the new Ethernet Edge Switch in the signal cabinet.
02-0914 (New)	SR 1167 (Williams Road) at SR 1113 (Old Cherry Point Rd.)	Extend new 12-fiber drop cable from ramp(s) signal at 02-0514 to this signal location. One 12-fiber drop cable shall be used for the two signals along Williams Street. Install fiber to the optical ports on the new Ethernet Edge Switch in the signal cabinet.
<u>02-0919 (New)</u>	<u>SR 1167 (Williams Road) at Realigned -SR3 Alt- / Trent East Crossing Entrance</u>	<u>Extend new 12-fiber drop cable from ramp(s) signal at 02-0514 to this signal location. Install fiber to the optical ports on the new Ethernet Edge Switch in the signal cabinet.</u>
02-0197 (Existing)	SR 1131 (Airport Road) at US 70 Ramps	Install new 12-fiber drop cable along one of the ramps from the new 144-fiber Trunk cable installed along US-70. Install fiber to the optical ports on the new Ethernet Edge Switch in the signal cabinet.

02-0779 (Existing)	SR 1922 (Taberna Way) at US 70 Ramps	Install new 12-fiber drop cable along one of the ramps from the new 144-fiber Trunk cable installed along US-70. Install fiber to the optical ports on the new Ethernet Edge Switch in the signal cabinet. Install new Cellular Modem at this location for remote access. This location can be revised to a more optimal signal location during design.
02-0464 (Existing)	SR 1116 (Thurman Road) at US 70 Ramps	Install new 12-fiber drop cable along one of the ramps from the new 144-fiber Trunk cable installed along US-70. Install fiber to the optical ports on the new Ethernet Edge Switch in the signal cabinet.

Centrac Software, Ethernet Communications Infrastructure

A. ~~PLANS AND SUBMITTALS~~ DELIVERABLES

The Signal Communications or Conduit Routing Plans shall consist of the three (3) major items listed below:

- Signal Communications Plans including Fiber Optic Splice Plans
- Project Special Provisions
- Catalog Cut Sheets (Material Submittals)
- System Test Plan
- Typical Detail Drawing of Special Oversized Heavy Junction boxes with Steel Covers
- Final Plans and Project Special Provisions in .pdf and Microstation format

Submit a 60% set of preliminary plans, a 100% unsealed set of project plans including project special provisions. Upon review and acceptance by the Department provide a 100% set of sealed plans and project special provisions to the Department. No construction related to the installation of the system the Department has accepted the 100% sealed RFC plans and specifications. Submit *Typical Detail Drawing* to show conduit entrances into special oversized heavy duty junction boxes for review with 60% and 100% plans.

Submit all material submittals with catalog cuts and installation requirements

Submit system testing requirements for review by the Department.

Provide the Department with a minimum of 10 working days for each review.

After acceptance of RFC Signal Communications Plans, the Design-Build Team shall provide the final Signal Communications Plans to the Department in .pdf and MicroStation format.

~~Prior to construction, the Design-Build Team shall provide a detailed set of Signal Plans, Signal Communications Plans including splice plans, Project Special Provisions and Catalog Cut Sheets as required above for the Department's review and acceptance. No construction related to the installation of the system shall begin until NCDOT has accepted the RFC Plans.~~

B. MATERIALS

When existing equipment (network equipment, cables, fiber, conduit, etc.) is replaced, the Design-Build Team shall replace existing equipment with new equipment. All material, equipment and work shall adhere to the *Standard Specifications for Roads and Structures* requirements. Materials, where applicable, shall be pre-approved on the Department's QPL. The QPL web site is:

<https://connect.ncdot.gov/resources/safety/Pages/default.aspx>

Prior to incorporation, the Design-Build Team shall provide detailed specifications for all material, equipment and/or work that is not covered in the 2018 *Standard Specifications for Roads and Structure* for Department approval. The Design-Build Team shall provide specifications and plans that address the material requirements and construction methods. No equipment or material shall be installed until it has been approved by the Department in writing. Catalog cuts will not be required for items on the QPL. Items not listed on the QPL shall require Department written approval prior to incorporation.

C. LOCAL AREA NETWORK

For the Ethernet based system the Design-Build Team shall furnish equipment that complies with IEEE Standard 802. The Design-Build Team shall collaborate with the NCDOT Division 2 Network Operator to furnish the necessary network configuration data, including but not limited the Project IP addresses, default gateway, subnet mask, VLAN, and configuration files to program the field Ethernet switches. Furnish all necessary equipment for a complete LAN, including but not limited to field-hardened Field Ethernet Switches. LAN equipment shall be fully integrated, providing local device failover and fault tolerance, virus protection, user authentication, and security functions to prevent unauthorized user and data from entering the LAN.

The Design-Build Team shall ensure that the field Ethernet edge switch install in the signal cabinets are fully compatible with the NCDOT Division 2 existing Network Management Software.

The Design-Build Team shall ensure that all plans and designs conform to the NCDOT and NC Statewide IT Policies and Standards as described at:

<https://www.scio.nc.gov/mission/itPoliciesStandards.aspx>

The Design-Build Team shall submit all architecture of the IT modules for review and approval by NCDOT IT and the NC Office of Information Technology architecture groups.

D. INTEGRATION & TESTING

The Design-Build Team shall integrate and test the new Standalone Closed Loop Ethernet based Signal System. The Design-Build Team shall develop a **sSystem tTest pPlan** to test that the components of the system operate to form a fully functioning Standalone Closed Loop Ethernet System with functional remote access and submit to the Engineer for review and approval. This includes, but is not limited to the fiber optic communications cable, the Ethernet Switches, the grounding system, and the remote access by cellular modem. Upon completion of the system

installation and integration, the Design-Build Team shall conduct component and system tests in accordance with the approved test plans and procedures. The Design-Build Team shall be responsible for providing all necessary test equipment.

In case of failures and substandard performance, the Design-Build Team shall identify the cause of failure and/or substandard performance, repair or replace the faulty parts and components and repeat the test. If the problem persists, the Design-Build Team shall replace the entire unit causing the problem prior to repeating the test at no additional cost.

After successful completion of all units and system test, the Design-Build Team shall submit the test reports, along with the record of repairs and part replacements, to the Engineer.

IV. SIGNAL SYSTEM TIMING PLANS

The Design-Build Team shall coordinate and implement all signal designs at the appropriate time as directed by the Engineer.

Prior to final design and installation, the Design-Build Team shall coordinate all signal phasing recommendations with the Division Traffic Engineer, Regional Traffic Engineer, municipal traffic engineering staff (as necessary for signals in a municipal signal system), ITS & Signals staff, and Central Office System Timing staff.

The Design-Build Team shall maintain, monitor, and adjust the traffic signals, both vehicle and pedestrian, as needed throughout the project construction.

The Design-Build Team shall be responsible for reviewing the phasing and timing of each traffic signal installation to ensure optimal operation:

- At least once every four weeks throughout the Contract
- In conjunction with all alterations of traffic patterns
- As an integral part of all traffic management plans

The Design-Build Team shall be responsible for the design and implementation of all temporary and final signal designs needed to maintain vehicular and pedestrian traffic during construction, including but not limited to, signal system timing plans.

If necessary, temporary traffic signal designs and implementations shall include, but not be limited to, new cabinets, controllers, cables, poles, spans, heads, and timing plans.

Prior to placing traffic in a new pattern, all traffic signals shall be installed and operational, including but not limited to, signal system timing plans and interconnection to the signal system.

Prior to implementation, all signal system timing plans shall be reviewed and accepted by the ITS and Signals Unit and Central Office System Timing section.

All signal timing plans must be completed by a firm prequalified by NCDOT in *Discipline Code 210 – Signal System Timing Development and Implementation* and under the direct charge of a North Carolina certified Professional Engineer.

Signal Timing Plans will be prepared in accordance with the latest edition of the following:

- NCDOT Traffic Management and Signal Systems Unit Design Manual
- NCDOT Signal System Timing Philosophy Manual
- The Manual on Uniform Traffic Control Devices (MUTCD)
- North Carolina Supplement to the MUTCD
- Customary practices for plan preparation, including CADD conventions, of the NCDOT ITS & Signals Unit

Signal Timing Plans should reflect existing time-of-day scheduling and may need to address some or all of the following items:

- Weekday peak/non-peak traffic periods (am, pm, midday, off-peak, etc.)
- School/University start/end and/or class change peak periods
- Seasonal traffic patterns
- Pre-scheduled holiday traffic patterns
- Incident management traffic patterns (detour routes, alternate routes, evacuation routes, etc.)
- Other special event traffic operations

For Signal Timing Plans to run properly and effectively, the signalized corridor(s) shall be reviewed to verify the items below. Note that adjustments may be required in order to work around some of these issues during construction.

- Existing geometrics and signal phasing match the timing plans
- Speed limits and distances between intersections match the timing plans
- All equipment is in necessary working order including controllers, detectors, communication, etc.
- Verify that field programming matches the most-recent traffic signal Plan of Record (POR) or applicable temporary signal design configuration.
 - Any discrepancies that may affect plan design shall be brought to the attention of the Deputy Division Traffic so that a course of action to correct the changes can be made prior to development and implementation of the coordination plans.
- Some examples of issues that could affect the timing plans and/or operations include:
 - loops not detecting vehicles
 - pedestrian push buttons that don't work
 - signal heads rotated or displays not functioning
 - communication issues with local controllers
 - blank controller screens
 - programming discrepancies with the most-recent Plan of Record

For signal systems with existing timing plans in place, contact the Deputy Division Traffic Engineer and/or Central Office System Timing group in order to obtain *TransLink32*, *Synchro*, and *Tru-Traffic* files for the system.

- Any such files given to the Team shall be updated to reflect the final configuration of the system and returned to NCDOT.

For signal systems without existing timing plans in place, digital files shall be created in *TransLink32*, *Synchro*, and *Tru-Traffic* that reflect the final configuration of the system timing plans.

- Develop *Synchro* network model for existing conditions.
 - Interpolation of traffic counts is acceptable for non-critical intersections when count data is not available.
 - Ensure that all intersection geometrics, timing data, and phasing data in *Synchro* match field conditions and *TransLink32*.
- Ensure that all settings in *Synchro* and *Tru-Traffic* match.
- Develop/update *TransLink32* database.
 - Develop/update Master Graphics.
 - All new graphics should use photogrammetry and/or signal design plans as a minimum standard
 - Internal *TransLink32* default graphics will not be acceptable
 - Intersections and detectors shall be labeled
- Ensure all system detectors are assigned and the detector data is logging in field.
 - Make the necessary assignments and enable data logging if not properly implemented already

Final signal timing plans shall be fine-tuned after they are implemented to ensure they operate as efficiently as possible.

UTILITIES COORDINATION SCOPE OF WORK (4-5-2018)

The Design-Build Team shall obtain the services of a Professional Services Firm (PSF) knowledgeable in the NCDOT Utility Coordination Process involved with utility relocation / installation and highway construction. The aforementioned PSF shall be responsible for coordinating all utility relocations, removals and / or adjustments where the Design-Build Team and utility owner, with concurrence from the Department, determine that such work is essential for highway safety and performance of the required highway construction. Coordination shall be for all utilities whether or not they are specifically identified in this Scope of Work and shall include any necessary utility agreements when applicable. NCDOT will be the approving authority for all utility agreements and approval of plans.

During the procurement phase, the Department will allow no direct contact, either by phone, e-mail or in person, between the Design-Build Team and utility owners until after the meetings between each individual proposer and the affect utility owners. After the aforementioned meetings, the Design-Build Team will only be allowed direct contact with the utility owners when the aforementioned PSF is present. (Reference the *Individual Meeting with Proposers* Project Special Provision found elsewhere in this RFP.)

In accordance with the requirements herein, the Design-Build Team shall relocate / coordinate the relocation of all existing facilities that are 1) parallel to a roadway in full control of access, 2) in physical conflict with the construction, 3) beneath the existing or proposed pavement structure and structurally inadequate, and / or 4) beneath the existing or proposed pavement structure and consist of unacceptable material. Proposed / relocated underground facilities that are located beneath the pavement structure shall only be allowed to cross the roadway as close to perpendicular as possible.

The Design-Build Team shall identify all new and existing Utilities that are affected by embankments and shall evaluate settlement impacts on these affected Utilities. The Design-Build Team shall evaluate the impacts of abandoned Utilities on anticipated settlements and impacts to proposed structures. The Design-Build Team shall design new and relocated Utilities to accommodate the anticipated settlements and to operate effectively during construction and throughout the design life of the structure. Where Utilities are placed longitudinally within 5 feet of the face of wall, the Design-Build Team shall provide settlement calculations as well as recommendations for protecting the utility if settlement calculations exceed 1 inch. Where conduits or Utilities run parallel to a retaining wall, impacts to the global stability of the retaining wall shall be evaluated for wall heights greater than 6 feet. Where pipes are planned parallel to face of walls, situated behind the wall face, these instances should not be considered normal construction but should be reviewed by the Department on a case-by-case basis. All utility crossings shall be made either at the interchanges or where the amount of fill is less than 10' in height.

Project Details

The Design-Build Team shall be responsible for verifying the utility locations, type of facilities, and identifying the utility owners in order to coordinate the relocation of any utilities, known and unknown, in conflict with the project. The following utilities are known to be located within the project construction limits:

Utility Owner	Utility Type	Cost Responsibility
Craven County	Telecommunications	Craven County
CenturyLink	Communications	CenturyLink
Craven County	Water	NCDOT (normally)
City of New Bern	Water & Sewer	NCDOT (normally)
Spirit/MCNC	Communications	Spirit
Piedmont Natural Gas	Gas	PNG(normally)
Spectrum	Communications	Spectrum
Suddenlink	Communications	Suddenlink
City of New Bern	Communications	City of New Bern
City of New Bern	Electric	NCDOT (prior rights)
NCDOT	Signalization	Design Build Team

Water and Sewer

If the Design-Build Team's design and / or construction requires the relocation and / or encasement of existing water and / or sewer facilities, designs shall be coordinated with the Division Utility Engineer or designee. All costs associated with the design and construction for relocation and / or encasement of these existing water and / or sewer facilities shall be the responsibility of the Design-Build Team and shall be included in the lump sum bid for the project. The Design-Build Team shall develop designs; prepare all plans for needed agreements and permits; submit permits directly to the agencies and obtain approval from the agencies. The Design-Build Team shall be responsible for all permit fees.

For all parcels with access to existing water and / or sewer facilities that the project subdivides, the Design-Build Team shall design and construct water / sewer facility extensions to all sub-divided parcels, including but not limited to the sub-divided parcel with the existing water / sewer access, if necessary. The aforementioned water facility extensions shall be installed completely within the right of way. The aforementioned sewer facility extensions shall be installed completely within the right of way or a recorded easement. All costs associated with the design and construction of water / sewer facility extensions to sub-divided parcels shall be included in the Design-Build Team's lump sum bid for the project.

Designs shall be coordinated with the Division Utility Engineer or designee and the utility owners or their representatives. In .pdf format, the Design-Build Team shall electronically submit one half-size set and one full size set of utility construction drawings to the Division Utility Engineer or designee, via the Division ~~Design-Build Unit~~, for further handling. Each set shall include a title sheet, plan sheets, profiles and special provisions, if required. Once accepted by the Division Utility Engineer or designee, the plans, with the appropriate agreement, will be sent to the utility owner for their review and concurrence.

The relocation and / or encasement of all water and sewer facilities shall be done in accordance with the NCDOT policies and standards and in accordance with the facility owner's standards. In the event of conflicting design parameters in the requirements noted above, the proposed design shall adhere to the most conservative values. The materials and appurtenances proposed by the

Design-Build Team shall require approval by both NCDOT and the aforementioned appropriate utility owner prior to installation.

Utility Relocation Plans

Excluding water and sewer conflicts, if the Design-Build Team's design and / or construction create a utility conflict, the Design-Build Team shall request that the utility owner submit relocation plans (Highway Construction Plans to be provided by the Design-Build Team to utility owners) that show existing utilities and proposed utility relocations for approval by the NCDOT.

In .pdf format, the Design-Build Team shall electronically submit one half-size set and one full size set of the Utility Relocation Plans to the NCDOT State Utilities Manager, via the ~~Design-Build Unit~~ [Division](#), for review and approval. The Department shall approve the Utility Relocation Plans prior to any utility relocation work beginning. The Design-Build Team shall also be responsible for submitting the appropriate agreements to be used with the Utility Relocation Plans (See Agreements Section found elsewhere in this Scope of Work). After the review process is complete, the Division Utility Engineer or designee will submit an electronic copy of the authorization letter to the Design-Build Team. The Division Utility Engineer or designee will also submit an electronic copy of the approved Utility Relocation Plans, estimate and agreement to the Department's Resident Engineer. If the Utility Relocation Plans are approved subject to changes, it shall be the Design-Build Team's responsibility to coordinate these changes with the appropriate utility owner.

Cost Responsibility

The Design-Build Team shall be responsible for all costs associated with relocating and / or encasing water and sewer facilities, as described in the Water and Sewer Section of this Scope of Work.

The NCDOT will be responsible for all other non-betterment utility relocation cost when the utility owner has prior rights of way / compensable interest. The utility owner shall be responsible for the relocation costs if they cannot furnish evidence of prior rights of way or a compensable interest in their facilities. The Design-Build Team shall be responsible for verifying / determining the cost responsibility (prior rights and compensable interest) for the utility relocations. The Design-Build Team shall be responsible for all costs associated with utility relocations due to haul roads and / or any other temporary conditions resulting from the Design-Build Team's methods of operation or sequence of work.

Compensable Interest

Typically, affidavits, recorded easements or NCDOT agreements can serve as evidence of prior rights. A compensable interest is identified as follows:

- (A) Existing or prior easement rights within the limits of the project, either by recorded right of way or adverse possession (Utility occupying the same location for twenty (20) plus years outside the existing highway rights of way).

- (B) Entities covered under General Statute 136-27.1 and 136-27.2. Statute requires the NCDOT to pay the non-betterment cost for certain water, sewer and gas relocations.
- (C) Utilities that have a joint-use agreement that constitutes a compensable interest with entities that have existing or prior easements rights within the project limits.

Work Performed by Design-Build Team for Utility Owners

If the Design-Build Team elects to make arrangements with a utility owner for proposed utility construction not required herein, in which the utility owner shall be responsible for the costs of work to be performed by the Design-Build Team, the Design-Build Team shall be responsible for negotiating all costs associated with the proposed construction. Once the Design-Build Team and the utility owner agree on a plan and a lump sum estimated cost for the utility construction, the Design-Build Team shall electronically submit one half-size set and one full size set of the utility construction drawings, in .pdf format, to the Division Utility Engineer or designee, via the Division, for further handling. Each set shall include a title sheet, plan sheets, profiles and special provisions, if required. Also, a letter from the utility owner agreeing to the plans and lump sum cost must accompany this package. The NCDOT will reimburse the Design-Build Team the estimated lump sum cost under a Supplemental Agreement. The necessary Utility Construction Agreement (UCA) to the utility owner for reimbursement shall be a two-party agreement between the NCDOT and the utility owner; and will be developed and executed by the Department.

If the Design-Build Team is requested, in writing, by a utility owner to relocate facilities not impacted by the project's construction, and / or upgrade or incorporate new facilities as part of the highway construction, designs shall be coordinated with the utility owner and Division Utility Engineer or designee. The associated design and construction costs shall be negotiated and agreed upon between the Design-Build Team and the utility owner. The Design-Build Team shall develop designs; prepare all plans for needed agreements and permits; submit permits directly to the agencies and obtain approval from the agencies. The Design-Build Team shall be responsible for all permit fees.

Cable TV

The cost in relocating CATV due to highway construction shall be the responsibility of the CATV Company; however, 1) if the CATV Company can validate a recorded easement for facilities outside the maintained NCDOT right of way, the Department will bear the relocation expense; and 2) if the adjustment is needed on existing utility poles to accommodate a proposed NCDOT Signals and Intelligent Transportation Systems (ITS) Fiber Optic Communication Cable Project, the Design-Build Team shall be responsible for the relocation cost.

The NCDOT will not permit CATV to place poles within the highway right of way but will allow down guys for their facilities within the highway right of way. Under most circumstances, the CATV Company will continue a joint-use attachment with the local power and telephone company. If the CATV proposed relocation places buried facilities within the highway right of way, then plans and encroachment agreements shall be required by the NCDOT.

Communication Cables / Electrical Services for ITS

Prior to establishing the location for new meter poles, the Design-Build Team shall coordinate with the local power distribution company concerning accessibility of E/C service and safety in maintenance of the meter.

Prior to installation, the Design-Build Team shall provide plans for review and approval for all service taps that require a parallel installation within the control of access (C/A).

Parallel service installation within a C/A shall be buried and located as close to the right of way line as practical. Only due to unusual circumstances will parallel aerial service installations within the C/A be allowed. The Design-Build Team shall justify the allowance of parallel aerial service installation and obtain NCDOT approval prior to installation

The Design-Build Team shall be responsible for all coordination activities, including deposit fees, required for the utility company to provide service taps. Prior to the Design-Build Team developing the associated design and / or instructing the utility company to proceed with providing the service taps, the Design-Build Team shall obtain written approval of the service tap locations from the Resident Engineer.

The Design-Build Team shall be responsible for all costs associated with providing communication cables / electrical service from the service tap to the ITS devices.

Adjusting Existing Utilities due to Proposed Signals and Intelligent Transportation Systems (ITS) Fiber Optic Communications Cables

The Design-Build Team shall be responsible for all costs for coordinating and adjusting any utilities that are in conflict with any proposed communication cables.

Requirements for Attachments to Existing and / or Proposed Structures

The Design-Build Team shall avoid attachments to structures where feasible. Attachments shall only be considered when other alternatives are cost prohibitive and / or are not feasible due to environmental or geographical features. All utility related attachments must be evaluated and approved by the Division Utility Engineer or designee, including any existing attachments to any structure(s) that require modification or replacement. Attachments shall be prohibited under the following conditions:

- (A) No attachments shall be allowed to a bridge located parallel within the C/A carrying the freeway over streams, other roadways or railroads. (No parallel utility installations within the C/A)
- (B) No attachments shall be allowed to cored-slab bridges.
- (C) No attachments shall be allowed to curved bridges.

Attachments to structures, if approved by the Division Utility Engineer or designee, shall meet the following criteria:

- (A) No attachments shall be allowed below the bottom of the beams and / or girders.
- (B) Drilling of, or attachments to, beams and / or girders shall not be allowed. Attachments shall only be allowed to the bottom of the bridge deck.
- (C) For water and sewer force mains, only restrained joint ductile iron pipe shall be allowed.
- (D) A minimum of 18" of clearance to beams and / or girders shall be maintained if possible.

Documentation of adverse conditions or cost estimates of all feasible alternatives shall be submitted to the Division Utility Engineer or designee, via the Division, when seeking approval of a structure attachment. Cost estimates shall consider all costs involved with each alternative and impacts to the utility and the highway project as a whole.

City of New Bern Pump Assist Sewage Lift Station located in between Hwy 70W and the service road at the intersection with Garner Road

If the Design-Build Team's project design impacts the operation of the CoNB pump assist sewage lift station, as determined by the Department, then the Design-Build Team shall design and relocate said lift station according to the specifications and standard of the Department or the City of New Bern, whichever are more stringent.

GENERAL

The Design-Build Team shall not commence work at points where the highway construction operations are adjacent to utility facilities, until making arrangements with the utility owner to protect against damage that might result in expense, loss, disruption of service or other undue inconvenience to the public or utility owner. The Design-Build Team shall be responsible for damage to the existing or relocated utilities resulting from the Design-Build Team's operations. In the event of interruption of any utilities by the project construction, the Design-Build Team shall promptly notify the utility owner and cooperate with the utility owner in the prompt restoration of service.

The utility information provided in this Request-For-Proposal is based off of the most current information available at the time. It is the sole responsibility of the Design-Build Team to investigate / verify the accuracy of the utility information provided by facility owners and included in this Request For Proposal. The cost for any third-party investigation will be borne by the Design-Build Team.

The Design-Build Team shall accommodate utility adjustments, reconstruction, new installation and routine maintenance work that may be underway or take place during the progress of the contract.

If total property acquisition is unavoidable due to encroachment into wells and / or septic systems, the Design-Build Team shall investigate and determine if extending water and / or sewer lines to the affected property is cost effective. If the Department concurs with the determination that a utility extension is cost effective, the costs associated with the utility design and construction shall

be addressed in accordance with Article 104-7 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

The Design-Build Team shall be required to use the guidelines as set forth in the following:

- (A) *NCDOT Utility Manual - Policies & Procedures for Accommodating Utilities on Highway Rights of Way* and the *NCDOT Utilities Policy Manual*. If the two aforementioned manuals contradict each other, the *Utilities Policy Manual* shall govern. Reference the website noted below for the current version of the NCDOT utility manuals, and additional information on the transition to the new utility manuals that shall be adhered to:

<https://connect.ncdot.gov/municipalities/Utilities/Pages/UtilitiesManuals.aspx>

- (B) *Federal Aid Policy Guide* - Subchapter G, Part 645, Subparts A & B
- (C) Federal Highway Administration's *Program Guide, Utility Adjustments & Accommodations on Federal Aid Highway Projects*
- (D) *NCDOT Construction Manual Section 105-8*
- (E) *NCDOT Right of Way Manual*
- (F) *NCDEQ Public Water Supply* - Rules governing public water supply
- (G) *NCDEQ Division of Water Resources* - Title 15A - Environment and Natural Resources

Agreements

If a utility company can provide evidence of prior rights of way or a compensable interest in their facilities, the Design-Build Team shall coordinate the non-betterment utility relocation costs with the utility company and develop the Utility Relocation Agreement, (URA).

The NCDOT Division Utility Engineer or designee must execute approved agreements on Design-Build projects. The URA's and Encroachment Agreements are available from the NCDOT Utilities Unit. Reference the *NCDOT Utility Manual Policies & Procedures for Accommodating Utilities on Highway Rights of Way* for the different types of Encroachment Agreements available for use.

The Design-Build Team shall develop a preliminary Utility Analysis and Routing Report (UARR (p)) to identify potential utility conflicts, determine preliminary alignments and schedules for the relocation of each utility, and identify any anticipated Permanent Utility Easements (PUE). The aforementioned UARR (p) shall be submitted to the NCDOT Division Utility Engineer or designee via the Division Construction Engineer, for review a minimum of ten days before the Right of Way Plans submittal.

The Design-Build Team shall submit all utility agreements, and all supporting documents to the NCDOT Division Utility Engineer or designee, via the Division Construction Engineer, in electronic format. Prior to submittal, all agreements shall be signed electronically by an authorized

representative of the utility owner. These electronic agreement packets will be reviewed, approved and signed electronically by the NCDOT Division Utility Engineer or designee, or designated representative, before being distributed to the field.

The Design-Build Team shall utilize the NCDOT Standard Utility Encroachment Agreements, as necessary, in relocating utilities. The Encroachment Agreements shall be used under the following conditions:

- (A) If a utility company is not occupying a valid right of way / compensable interest and the proposed relocation will place the relocated utilities within the existing or proposed highway right of way.
- (B) For **all** new utility installations, not covered under a Utility Construction Agreement and within the existing or proposed highway right of way. This includes all water, sewer and gas lines owned by entities covered under *General Statute 136-27.1* and *136-27.2*.